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MOTOR AGE

Ford No Infringer of Selden Patent

Judge Noyes of Second Circuit United States Circuit Court of Appeals Decides That While the Patent is Valid the Defendants Have Not Been Guilty of Infringement, Contention Being That Selden Engine Was of Brayton Two-Cycle Type

NEW YORK, Jan. 11—Judge Noyes, of the second circuit United States circuit court of appeals today handed out a written decision, which is concurred in by his fellow judges, Lacombe and Ward, that Henry Ford, of the Ford Motor Co., Detroit, Mich.; C. A. Duerr & Co., Panhard & Levassor, O. J. Gude Co., John Wanamaker, et al., have not infringed the Selden patent, controlled by the Columbia Motor Co. and George B. Selden, and under which patent all of the eighty-nine members of the Association of Licensed Automobile Manufacturers have been building motor cars for several years. The decision means that the Selden patent originally applied for by George B. Selden, of Rochester, N. Y., in May, 1879, and granted November 5, 1895, is a valid and true patent, but that Ford and the others are not infringers of it. This was an entirely unexpected phase of the situation. The court holds that the Selden engine was of the Brayton two-cycle type, whereas practically all of the motor cars built today use motors fashioned after the Otto type, and so are not infringing the Selden claims. On this phase of the decision the court says:

"While the conclusion of non-infringement which we have reached leaves the patentee (Selden) empty-handed with respect to the patent for the short time it has to run, it cannot be regarded as depriving him, through any technicality, of the first reward of his labors. He undoubtedly appreciated the possibilities of the motor vehicles at a time when his ideas were regarded as chimerical. Had he been able to see far enough he might have taken out a patent as far-reaching as the circuit court held this one was. But like many another inventor, while he had conception of the object to be accomplished, he went in the wrong direction.

"The Brayton engine was the leading engine at the time—1879—and his attention was naturally drawn to its supposed advantages. He chose that type. In the light of events we can see that had he appreciated the superiority of the Otto type of engine and adopted that type for his combination, his patent would cover the modern motor car. He did not do so.

OTTO'S CLAIMS

A gas motor engine wherein by one out-stroke of the piston separate charges of combustible gaseous mixture and of air are drawn into the cylinder, which charges are compressed by the in-stroke and then ignited so as to propel the piston, which, by its return stroke, expels the product of combustion. The combination of a cylinder piston, engine shaft, countershaft, crank, inlet and outlet valves, cams and lever for operating the valves with a slide and cam for regulating the gas supply, all arranged to produce the above results.

In gas motor engines wherein charges of combustible gas and air are introduced separately into the cylinder, regulating the power of the engine by controlling the gas supply by means of a valve operated by a governor.

A gas motor engine wherein an intimate mixture of combustible gas and air is introduced into the cylinder separate from the charge of air or other incombustible gas in such manner and in such proportions that the particles of combustible mixture will be close together at the point of ignition but will be more and more dispersed in the charge of air forward of that point whereby the development of heat and the expansion or increase of pressure produced by the combustion are rendered gradual.

A gas motor engine wherein an intimate mixture of combustible gas or vapor and air is introduced into the cylinder separate from and subsequent to a charge of air, such introduction being affected through an aperture or apertures in the end surface of the cylinder in order to cause the charge of air to move forward in the cylinder as the combustible mixture is introduced.

A gas motor engine wherein a combustible gas mixture is exploded without doing work, and the contraction of the products of combustion due to cooling is utilized for producing motive power.

Method of alternately arresting and permitting the movement of the piston by regulating the flow of a liquid in a hydraulic cylinder. A combination of loose piston in a hydraulic cylinder with a passage and a valve operated by cam.

A combination of loose piston and a piston working in a hydraulic cylinder having a passage and valve operated by a cam with a suction valve and an adjustable discharge valve to utilize part of the motive power for pumping or forcing liquids.

BRAYTON'S CLAIMS

The following organisms in combination: A pumping engine for condensing air and gas, a reservoir for containing such agents, either separated or when mixed, and a cylinder and working piston provided with suitable automatic valve gear operating induction and eduction valves, when such cylinder is furnished with a perforated partition whose office is to maintain a torch to fire the successive charges of gaseous mixture as they are entering the cylinder, and prevent the back action of the igniting charge.

An apparatus for mixing atmospheric air and volatilized hydrocarbons in successive charges as in a motor car, when ignited, for a gas engine, consisting of a reservoir containing atmospheric air under pressure, in combination with a hydrocarbon chamber and an automatically actuated valve, which is arranged to intermittently admit compressed air to pass from the reservoir in successive charges into the hydrocarbon chamber.

The air reservoir for containing air under pressure, hydrocarbon chamber and an intermittent injector arranged to supply the chamber with hydrocarbon in successive charges.

He made the wrong choice, and we cannot, by placing any forced construction upon the patent or by straining the doctrine of equivalents, make another choice for him at the expense of these defendants, who, neither legally nor morally, owe him anything. The decrees of the court are reversed, with costs, and the causes remanded with instructions to dismiss the bill with costs."

Judge Hough Reversed

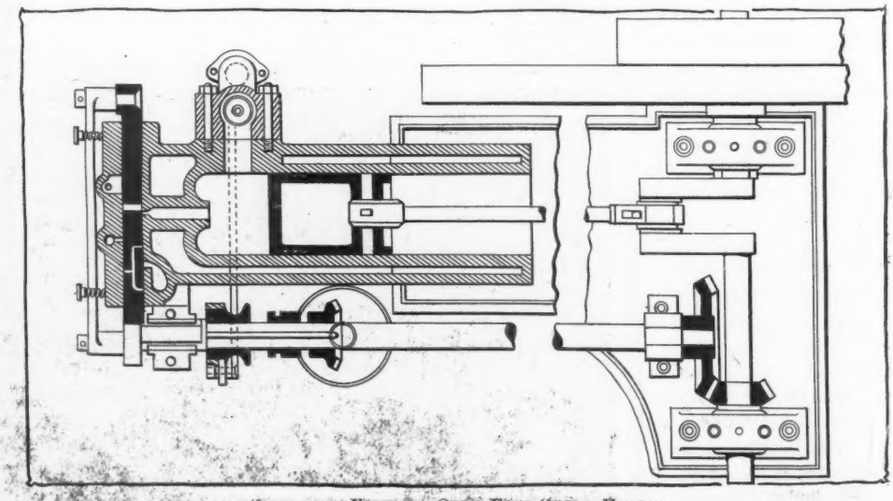
This decision reverses the decision of Judge Hough, of the circuit court, handed down September 15, 1909, which decision sustained the patent and held Ford and all other makers not in the licensed field infringers. Immediately Judge Hough's decision was rendered Henry Ford appealed the case, Ford having to deposit bonds to the extent of $350,000 before the case could be appealed, which bonds are now returned to him with Judge Noyes' decision. The arguments before the court of appeals, which gave its decision today, were made in the latter part of November, 1910, and the court decision filed today covers forty-two typewritten pages, and goes over the argument very fully. It is given verbatim in this issue of Motor Age.

It is not known definitely what course the Association of Licensed Automobile Manufacturers, through the Columbia Motor Car Co. and George B. Selden, will pursue, other than that they are arranging for a writ of certiorari, with a view of having the case go to the supreme court of the United States for final decision. The association issued a statement a few hours after the decision was announced, as follows:

"As the courts have disagreed on the merits of the Selden patent on gasoline motor cars, it was announced that the Columbia Motor Car Co. and George B. Selden are arranging for a writ of certiorari with a view of having the case go to the supreme court of the United States for final decision. Judge Hough sustained the patent by his decision in the United States circuit court for the southern district of New York, September 15, 1909, and held it infringed, but today the decision has been reversed, which, while holding the patent valid, decides that the Ford Motor Co, Panhard & Levassor and others had not infringed it. The litigation was long-drawn out, having started in 1903. The patent was recognized by more than half the industry prior to Judge Hough's decision of September 15, 1909, and following his sustaining of the patent as covering the modern gasoline motor car, a large number of other manufacturers secured licenses under it, and now it is estimated that almost 80 per cent of the gasoline motor cars, including almost all of the veteran manufacturers, have taken licenses under the patent. The argument on appeal was made the latter part of November. The opinion filed today, written by Judge Noyes and concurred in by Judges Lacombe and Ward, covers forty-five typewritten pages and although sustaining the validity of the patent, declares that defendants' motor cars in the case do not infringe."

Judge Hough Quoted

Although Judge Hough a year ago by his decision sustained the Selden patent and declared it infringed, he held practically the same ideas as Judges Noyes, Lacombe and Ward. Judge Hough, in his decision published at that time, said: "As a matter of fact, I believe that nearly all of the cars built in the United States when these actions began were modeled on French ideas, and used engines descended from Otto through Daimler, and not from Brayton through Selden or any other American. In short, this American patent represents to



SECTIONAL VIEW OF OTTO FOUR-CYCLE ENGINE

me a great idea conceived in 1879, which lay absolutely fallow until 1895, was until then concealed in a fine wrapper, and is now demanding tribute from later independent inventors—for the most part foreign—who more promptly and far more successfully reduced their ideas to practice.

"But the patent speaks from the date of issue, and unless Selden did something unlawful during his 16 years' wrangle with patent examiners, from 1879 until 1895, over the claims of the patent, or unless intervening American rights available to defendants spring up while Selden was rewording his claim, he was within the law and his rights are the same as those of the promptest applicant."

It was this long wait of 16 years when the patent claims were being examined by patent officials and being returned to Selden that created so much strong sentiment against the patent. But, as Judge Hough says, Selden acted within his legitimate rights, and had he been working on claims for an engine fashioned after the Otto type and not one of the Brayton type, he would have today had a valid patent, infringed by the manufacturers not in his association.

To Henry Ford belongs the premier honors of winning the case. Ford has at all times proved himself a foeman of the highest class and not for one moment did he waver in his fight, but when he deposited the $350,000 bonds to have the case taken to the court of appeals he announced his willingness to spend upwards of $12,000,000 in fighting the case and securing protection for owners of his cars.

Credit Belongs to Ford

Now everybody gives him the highest honors, members of the licensed or Selden forces were the first to send him telegrams of congratulations, and today the name of Ford is on the lips of everybody familiar with the motor industry and his fighting qualities are being admitted more than ever.

Now that the case is decided, many are wondering what will become of the Association of Licensed Automobile Manufacturers and what will be the general effect on the industry. The patent has but a year and some months to run—it would have expired November 5, 1912. It is a certainty that an organization knowing its main patent soon would expire would have some other means of holding its members together. The facts are that the decision, so far as can be learned, will not have the slightest effect on the association. Members of the industry require an association for the purpose of conducting the show and other businesses of mutual benefit and the field of possibility along this line is a great one.

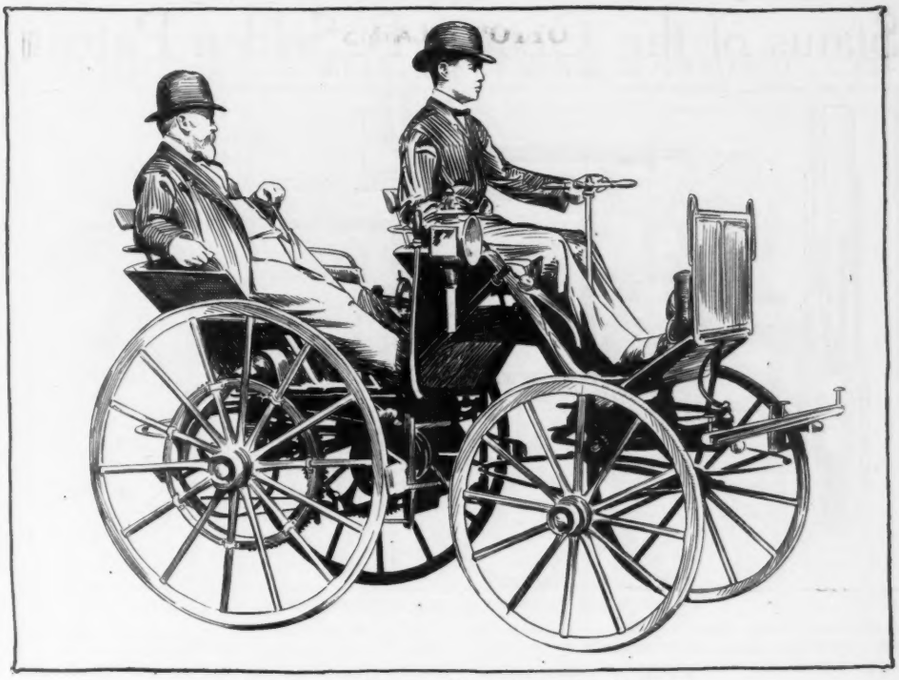
A. L. A. M. Has Patents

It may be the association will bring to the fore now its patents-holding company which was organized back in 1903, at which time it is reported it held as many as 525 motor car patents. Since that time many other patents have passed into the control of this company and it would appear that these interests would be a big bond of union for the association.

Regarding the general effect on the industry there cannot be anything in the unexpected happen. Some outsiders have stated that now that makers have not to pay any royalties to the association it will be possible to cut prices, but the facts are that the royalties to members were so small as to not be of the slightest consequence.

The rate was three-quarters of 1 per cent and out of the fund so received dividends were returned to the members of the association.

So far as the general public was concerned, its first knowledge of the Selden patent was received in the spring of 1906. The patent was applied for in 1879. It was kept alive in the United States patent office for nearly 17 years, a longer time than any patent has been kept in the office, until it finally issued November 5,



DAIMLER'S APPLICATION OF OTTO ENGINE TO MOTOR CAR

SELDEN'S CLAIMS

The combination with a road locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described.

The combination with a road locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device, and a suitable carriage body located above the engine, substantially as described.

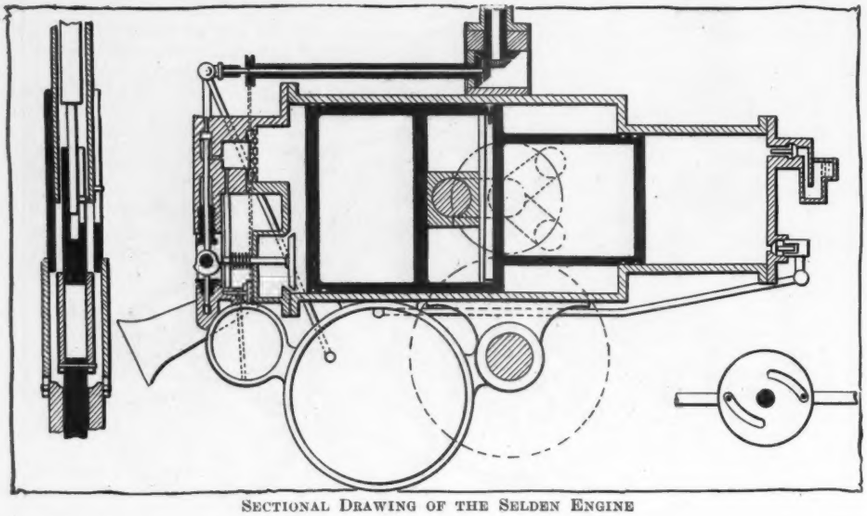
The combination with a road locomotive provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas engine of the compression type comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device, a suitable carriage body located above the engine, and a flexible or jointed connection between the engine and the body, substantially as described.

The combination with a road locomotive, provided with suitable steering mechanism, of a hydrocarbon engine applied to the driving axle and having flexible valve or clutch connections located within the steering mechanism, substantially as described.

The combination with a road locomotive provided with a propelling wheel, of a liquid hydrocarbon gas engine of the compression type, comprising two or more working cylinders and pistons arranged to act in succession during the rotation of the powershaft, a suitable liquid fuel receptacle, suitable devices for transmitting motion from the power shaft to the driving axle, and a clutch or disconnecting device, substantially as described.

The combination with a road locomotive, provided with a propelling wheel, of a liquid hydrocarbon gas engine of the compression type, comprising one or more unjacketed working cylinders communicating with a closed crank chamber, adapted to hold a cooling liquid, and a powershaft geared to run faster than the propelling wheel, substantially as described.

Status of the George B. Selden Patent is Briefly Described



SECTIONAL DRAWING OF THE SELDEN ENGINE

1895, several years after modern type cars were successfully running on both sides of the water. The patent shows an engine of the Brayton type mounted on the front axle propelling the front wheels and the whole being arranged so that it could be applied to horse-drawn vehicles instead of the front axle of the ordinary horse vehicle. The Brayton engine pumped air into a reservoir analogous to a steam boiler, which air was fed to an engine cylinder just as steam is fed to a steam engine, with the addition of fuel as it passed into the cylinder. This addition of fuel permitted the mixture to burn—not explode—within the cylinder at constant pressure, which burning expanded the air and made the small quantity of air furnished by the pump piston sufficiently large in volume to fill the large engine cylinder and drive the engine pistons, in spite of the resistance of the pump and the work to be done. Since this combustion was not of the instantaneous explosive kind, as is used in modern engines, this Brayton type engine could not run at high speed and seldom exceeded 150 to 200 turns per minute. It was therefore not well adapted to motor vehicle work, but Brayton had applied it to a street car in Providence in the early part of the seventies, and to an omnibus in Pittsburg about 1876, both of which vehicles ran, but neither of which was a commercial success. He also licensed the well-known mechanical authority, Joshua Rose, to make road vehicles and clearly had a monopoly of this type of engine for road vehicle propulsion, which monopoly expired and became public property at the expiration of the Brayton patents about 1889.

Early Work of Selden

Selden not only applied for a patent, but he began the construction of an engine of three cylinders and three pumps, which, however, he never finished. He succeeded in getting one cylinder and pump completed and running with some degree of success, when the further building of the vehicle was abandoned and was not again taken up for about 28 years, being actually finished in the early part of 1906. During the time his patent was at the office he, in the language of Judge Hough, "amplified" it.

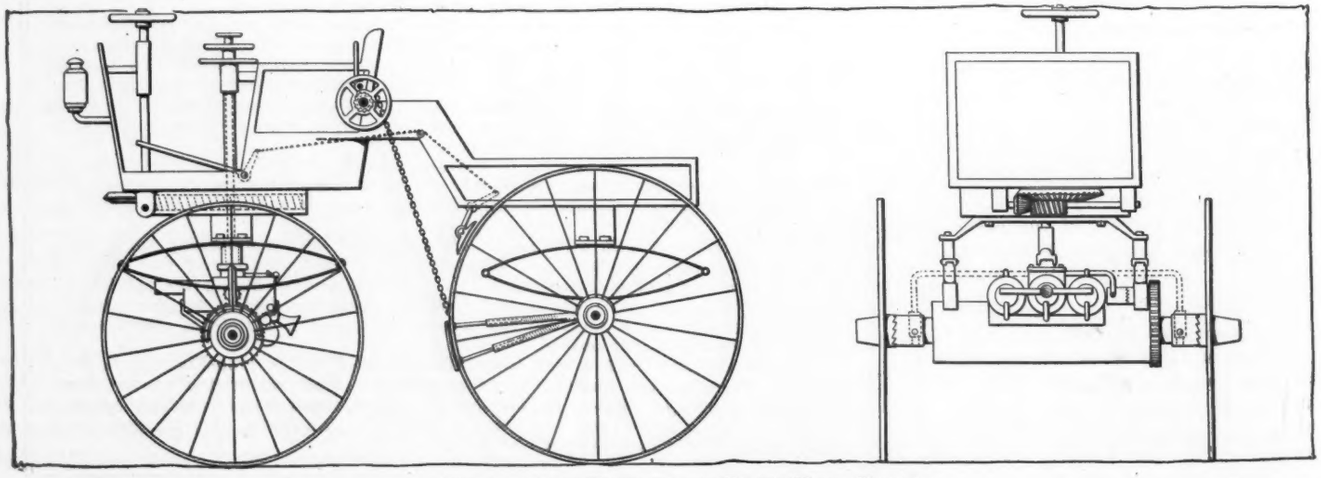
MUCH doubt exists in the public mind as to the exact nature and status of the Selden patent, which when carefully analyzed is a very simple patent. To quote from the original patent claims issued in 1879, it was

> "The combination with a road locomotive, provided with suitable running gear, including a propelling wheel and steering mechanisms, of a liquid hydro-carbon gas engine of the compression type comprising one or more cylinders, a suitable liquid fuel receptacle, a power-shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods substantially as described."

In the original trial court, the court decided that Selden was a pioneer in these patent claims and that other makers using motor cars today infringed the patent.

What the Patent Is

In a word, the patent is a combination one in which several parts are combined to form a motor car as used today. These combined parts are an engine of the compression type using gasoline or other petroleum as a fuel, a running gear consisting of frames, axles and springs, propelling wheels, connection between motor and propelling wheels so that this drive shaft or propeller shaft as it is known today in shaft-driven cars would revolve faster than the rear wheels, and lastly and of great importance the clutch of any type, whether cone, multiple-disk, expanding or contracting band, which would allow the motor to run with the car idle. The value of this important feature will be at once appreciated because there is not a gasoline car made today which would be operative were it not for this. According to the trial court, Selden adopted what is known as the Brayton two-cycle motor of the compression type, approximately 35 pounds compression, which was invented



SIDE AND FRONT VIEWS OF THE SELDEN MOTOR VEHICLE

Inventor's Idea Combination of Parts to Make a Motor Car

by one Brayton in 1872 and 1874. Selden took this motor and "devised and used an arrangement of it which Brayton never had attempted and which Brayton himself never suggested, made or patented." This claim is refuted in the court of appeals.

Selden Gets More Power

By this arrangement which Selden made it was possible to get more than 40 per cent power out of the Brayton engine and so make it possible for use on a running gear. The original Brayton engine was a very heavy two-cycle stationary design with an open crankcase. Selden enclosed the crankcase and greatly reduced the weight. He also changed the manner of furnishing the fuel to the cylinders which greatly enhanced its power and made it what might be called a high-speed engine.

From this brief statement of the case it is quite clear that the Selden patent was not the invention of some entirely new feature. Engines had been used on road vehicles previous to 1830 and were of the steam type. Clutches were old designs. The method of transmitting power from a motor to road wheels was old. In fact, every unit in Selden's combination patent was old. The trial court held that Selden's inventive act rested not in the substitution of his rearranged motor for another prior art or in the combination of his engine with elements which had been combined with steam engines; but in the arrangement himself that "he devised and used such arrangements as Brayton had never conceived."

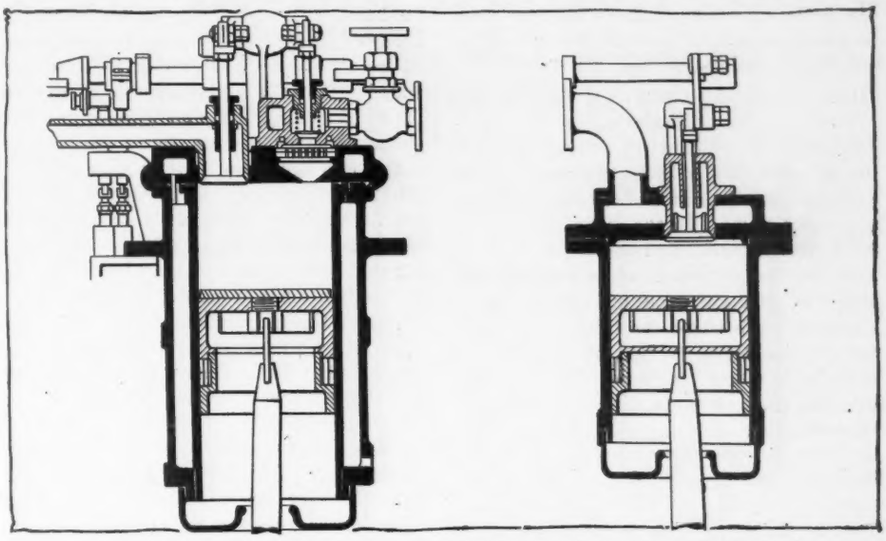
Real Factor in Decision

The real factor in the final decision which reverses the Selden patent is that the majority of present-day cars use the Otto engine type and not the Brayton type which the Selden patent covers. The trial court realized this and in its opinion stated: "As a matter of fact, I believe that nearly all the cars made in the United States when these actions began were molded on French ideas; and used engines descended from Otto through Daimler and not from Brayton through Selden or any other American."

The anti-Selden council in its recent brief, December, 1910, submitted to the circuit court of appeals or the second circuit, New York state, and which court gave the final decision this week, says: "The Selden engine was old and well-known. The small, high-speed motor car engine was the result not of Selden's arrangement of a Brayton engine, but of Daimler's improvement upon the Otto engine."

Dugald Clerk's Evidence

Dugald Clerk, the eminent English authority on gasoline motors, submitted a vast amount of evidence dealing directly with the early history of gasoline engines and his evidence was largely responsible for the final decision in which the court declared that Selden followed the Brayton engine, whereas modern cars employ the Otto. In speaking on the situation, Mr. Clerk gave the following evidence: "I may say that Selden disclaims the invention of any special engine. Stopping at this point it is necessary to recognize what type of engine is indicated. About this I have no difficulty whatever. I at once recognize it (Selden's engine) as an engine of the Brayton type, operating on the constant-pressure cycle."



SECTIONAL VIEW OF BRAYTON POWER CYLINDER AND COMPRESSION CYLINDER

Mr. Clerk's evidence further showed that the Brayton engine was well known previous to 1879 when Selden obtained his original patent. One of these engines had been exhibited at the centennial exhibition in Philadelphia, 1876. Selden not only saw it there, but sent a mechanic to study it. In his original patent applications Selden mentions his engine as old and well known; the patent office discovered in it nothing but a Brayton, and Selden admitted the correctness of its conclusion. Dugald Clerk not only admitted the correctness of such conclusion; but was surprised that it took the Washington patent office so long to reach it. He "at once" recognized the Selden engine as a Brayton. The trial court which decided in favor of Selden was of the opinion, however, that Selden's discovery was of "the lack, the something that had to be supplied before it was worth while to organize the vehicle," and that he, Selden, supplied "the lack" by an improved Brayton engine.

Dugald Clerk, in June, 1909, on the matter of Selden's improved Brayton engine, wrote: "Brayton constructed his engine in America. . . . He applied the inverted vertical engine to a tram car but did not succeed in running it commercially. The horizontal engine he applied to a boat. Two of the boats were in use upon the Hudson for some years. Brayton was enthusiastic and indefatigable and spent most of his life in his many experiments; ultimately he abandoned his American attempts and crossed over to England and died in Leeds while engaged with experiments on a new oil engine at large works there. His perseverance deserved a better reward. No one, however, has yet (1909) succeeded in carrying his type of engine further than he did."

Claimed by Defendants

This was submitted by the Panhard & Levassor and Andrea Massenant as evidence in their final brief, December, 1910, which brief brought about the final definition of the patent in which it is held that modern motor car is not an infringement of the original Selden patent.

In his testimony Dugald Clerk admitted that Selden did not in any way advance the motor car industry. No one ever attained commercial success with a Brayton engine; and that modern cars "were modeled on French ideas and used engines descended from Otto through Daimler and not descended from Brayton through Selden or any other American."

Clerk on Otto Engine

In speaking of the Otto two-cycle engine which was the determining factor in the decision, Dugald Clerk stated: "In 1876 Dr. Otto superceded his former invention by the production of the Otto silent engine, now known all over the globe. He began his work in 1854, attained his first success in 1866, and his epoch-making advance in 1876. He died at the age of 59 and other hands took up the development of his four-cycle engine. Daimler took up the work and originated his first small engine along the lines now used in all motor cars in 1883. It was a high-speed engine and used a light hydro-carbon fuel now known as gasoline. It used a surface

carbureter and dispensed with the slide ignition, substituting an open tube. These Daimler engines ultimately developed into the modern gasoline engine which performs such an important part in the life of all nations at the present time."

Other Interesting Facts

Some general information on the Brayton, Otto and other early patents is interesting. Brayton in 1872 obtained a patent for a gas engine. It had a working cylinder and a pump. In the pump gas from a main, which compressed and stored a reservoir, whence it passed to the working cylinder at the entrance of which was a constant torch which ignited the gas, particle by particle, so that it entered the cylinder in a state of flame. The reservoir of gas frequently exploded. Clerk, in speaking about this engine, said that "this accident became so troublesome that Mr. Brayton discontinued the use of gas and converted his engine into a petroleum one. The petroleum was pumped upon the grating into a groove filled with felt. The compressing pump then charged the reservoir with air alone. The air in passing through the grating carried with it the petroleum partly in vapor and partly in spray; the constant flame was fed by a small stream of air. The arrangements were, in fact, precisely similar to the gas engine, except in the addition of a small pump and the slight alterations in the valve arrangements. The difficulty of explosion into the reservoir was thus overcome, but a new difficulty arose—the cylinder accumulated soot with great rapidity and the piston required far too frequent removal for cleaning."

Brayton Tries Out Engine

About 1873 Brayton installed one of his engines in a Providence street car. It had only 4-horsepower and later he substituted for it a 12-horsepower engine. The space of one passenger was occupied by the engine and its connections. The car was operated repeatedly with each of the engines.

There is much interesting history which has been resurrected in connection with the present litigation. Newcomen in 1705 "made the piston engine a practical success," and since his time there have been features common to all engines, such as a cylinder, valves and the piston, so connected to the crankshaft that the back and forward movement of the piston is converted into rotary movement of the shaft. In 1784 a British patent was granted to James Watt, in which "my seventh new improvement is upon steam engines which are applied to give motion to wheeled carriages for removing persons or goods from place to place."

The Watt Patent

According to Professor Carpenter, the Watt patent showed in combination steering mechanism, engine, a powershaft arranged to run faster than the driven wheels, a clutch and the body. In 1828 Pecquer obtained French patents on a practical steam wagon. In 1858 the Lough and Messenger patents, covering a vehicle with two cylinders, 3½-inch bore and 5-inch stroke. This engine, after 2 years' constant running of 15 miles an hour on level roads, was pronounced a success. In 1865 British patents were granted to MacKenzie, in which the inventor stated: "The invention consists of various improved arrangements in connection with steam or other engines for driving omnibuses, carriages, fire and traction engines, etc." This vehicle incorporated a running gear, a two-cylinder engine, a propellershaft to run faster than the wheels, an intermediate clutch or disconnecting device. There is no mention made in this of a hydro-carbon engine of the compression type.

In 1871 United States patents were granted to Tellier for an improved ammonia engine for road locomotion. The use of external combustion motors was suggested among others by Brothier in 1865 and Carre in 1867. The Brothier patent shows the engine to be of the compression type. The Carre motor operated by air expanded by the combustion of liquid hydro-carbons. This was not an internal combustion engine but an engine used in compression and generating the supply of flame under pressure outside of the motor cylinder. It could not be called a hydro-carbon gas engine, because the term gas engine involves internal combustion and Carre's was an external combustion one.

Started in 1860

It was in 1860 or thereabouts that the real turn towards the modern engine took place. The Lenoir in 1860 was one of the earliest and Lenoir gets credit as being the inventor of the first gas engine ever actually introduced to public use. It was used for printing, pumping water, driving lathes, etc. The merits of his engine were considered in the leading scientific reviews of that time. Lenoir built an experimental road carriage propelled by one of his engines, which was proved to have repeatedly circled the factory in which it was manufactured, and on one occasion made a three-hour trip.

In 1867 United States letter patents were granted to Otto and Langel for an improvement in gas engines. The final Otto patent was issued in 1876.

What George Selden Accomplished

IN noting the work by way of improvement which Selden accomplished on the Brayton engine the brief filed by the Columbia Motor Car Co. and George B. Selden shows that the Brayton engines were each constructed with very heavy and bulky bed plates. Some of them were constructed with flywheels and a large, heavy walking beam, one end of which was connected to a piston rod and the other to a rod attached to the crankshaft. Brayton obtained two American patents for these engines, the first issued in 1872 for what is known as the Brayton gas engine, the primary fuel for which was street gas or illuminating gas. It has since become technically known as a constant pressure engine, having a constantly burning flame to ignite the mixture as it enters the combustion chamber.

The other Brayton patent was issued in 1874, being an improvement on the 1872 one, the improvement consisting in using a fibrous absorbent for absorbing a liquid hydro-carbon, and giving off the vapor therefrom, and also in using a deflector plate to deflect the air as it is forced through a central passage way, and to cause the air to pass over the fibrous absorbent, to pick up the gasoline.

Otto obtained two patents on his engine, on a British patent May 17, 1876, and the other August 14, 1877. This engine, known as the Otto Silent, came into commercial use in 1878. The Otto Silent engine was a compression type of large and bulky form, like the Brayton, and unsuited for combination with a road vehicle in not leaving room to carry the passengers. The Otto patent describes three kinds of hydro-carbon engines. One is a two-cycle non-compression engine; another is a two-cycle compression engine, the mixture being compressed outside of the cylinder; and the third is a four-cycle compression engine. Neither Otto nor Brayton was the inventor of the two-cycle of four-cycle engine, liquid hydro-carbon engines of these types having been invented many years previously. All of the hydro-carbon engines previous to 1879 were used only as stationary engines, excepting one or two of the Brayton. By way of comparison, the Brayton engine weighed 1,160 pounds and the Selden three-cylinder engine, with all of its parts, 370 pounds.

The brief shows that as early as 1873 Selden made experiments to determine the tractive power required to pull a load of 1,000 pounds over common roads. In 1873 he devoted considerable time to the question of whether or not the steam engine was practical for use on the common roads. In 1873 he decided the problem could not be solved with a steam engine, and so directed his thoughts to various other kinds of engines, as, for example, engines operated by ammonia gas or other volatile liquids. And also engines to be operated by bisulphite of carbon; others operated by nitrous oxid and also by kerosene. After these investigations he turned his thoughts to the liquid hydro-carbon engine of both the non-compression and compression types and finally decided that the problem could be solved only by a liquid hydro-carbon engine of the compression type.

His investigations led to two conclusions: first to construct a light weight engine of small bulk relative to power, and second to construct an engine that would manufacture its own fuel from the most compact primary fuel while traveling on the road. He discovered that he could obtain four times as much power from a compression engine as from a non-compression type of the same size. The brief shows that he could find no engine, according to the old art of building, suitable for his purpose.

Decision In Full In the Selden Case

Herewith Motor Age Presents Views of Judge Noyes and His Associates In the Suit Against Ford and Others Which Has Just Been Decided by the New York Court

APPEALS from decrees of the circuit court, southern district of New York, sustaining the validity, and finding infringement, of letters patent No. 549,160 granted November 5, 1895, to the complainant, George B. Selden, for an improved road-engine. The corporation complainant is the exclusive licensee under the patent. The opinion of the circuit court is reported in 172 Fed. 923. Noyes, circuit judge:

Although the title of the alleged invention as stated in the preamble of the patent is an "improved road-engine" it is claimed to embrace the essential elements of the modern automobile and has been sustained as being "so fundamental and far-reaching as to cover every modern car driven in any way by petroleum vapor and as yet commercially successful."

The subject is most important; the interests involved, of great magnitude; the record, phenomenally long, and the questions presented, complex. In examining these questions we have been greatly aided by the work of the judge of the circuit court in blazing the way through the mass of testimony and defining the issues to be decided. While we may be unable to adopt the conclusions stated in his very able opinion, we must at the outset acknowledge our indebtedness to it.

Ordinarily the first thing to be looked at in a patent suit is the patent. That is the source and measure of the patentee's rights. But in this case it seems desirable before we examine the patent to take up some preliminary considerations, the disposition of which may serve to indicate the standpoints from which the patent should be regarded in the examination to follow.

This patent was applied for in 1879 and granted in 1895. For over 16 years the application lay in the patent office and the applicant took full advantage of the periods of inactivity permitted by the rules and statutes. It is apparent that he delayed just as long as possible the issue of the patent to him. During this long time the automobile art made marked advances along different lines, and when in 1895 the patent was granted, it disclosed nothing new. Others had then made the patentee's discovery and had reduced it to practice in ignorance of what he had done. While he withheld his patent, the public learned from independent inventors all that it could teach. For the monopoly granted by his patent he had nothing to offer in return. From the point of view of public interest it were even better that the patent had never been granted. Judge Hough was quite within bounds in saying:

> "No litigation closely resembling these cases has been shown to the court and no instance is known to me of an idea being buried in the patent office while the world caught up to and passed it, and then embodied in a patent only useful for tribute."

It is urged that we should regard unfavorably the patent on account of this delay in the patent office; should seek to avoid giving it a broad construction, and should permit the alleged abuse of the law to weigh against the standing of the complainants in a court of equity. But the patentee acted wholly within his rights. He merely took advantage of the delays which the law permitted him. He followed strictly the statutes and rules of procedure, and the courts cannot exact a greater measure of diligence from him. When the patent was granted under the authority of the law, it became entitled to the consideration accorded to any other patent. If the statutes and rules permit unnecessary delays, they should be changed, but we reject the view that this court owes any duty to relieve against their operation. This patent, even if it be useful only for tribute, must be viewed without prejudice and with absolute judicial impartiality.

Object of the Invention

But while we should be careful to avoid viewing the patent with disfavor, we should be equally careful to avoid considering it with too much favor on account of its subject-matter. Fifteen years ago hardly anyone had seen a motor car. Ten years ago they were rare. Today they are in use by tens of thousands, and tens of millions of dollars are invested in them and in their manufacture. The development of the motor car has been nothing short of phenomenal and everyone is inevitably impressed with its importance. Consequently, when we see that thirty years ago an application for a patent was filed which even pointed the way to the modern motor car, we can hardly fail to receive the impression that an idea of great importance must have been embodied in it. But, as we shall later see, the development of the motor car was not so sudden as we have thought. It developed step by step at the beginning; the startling activity has come at the end. Moreover, a great idea may be embodied in a patent, and yet the patentee take nothing of value by it. That which he takes is that which he describes and claims. His discovery may be of importance but he may limit it by his claim and his claim may proceed in the wrong direction.

So, from any standpoint, we come in this as in other patent causes to the patent in suit in which at its commencement the patentee thus states the object of his invention:

> "The object of my invention is the production of a safe, simple, and cheap road-locomotive light in weight, easy to control, and possessed of sufficient power to overcome any ordinary inclination."

The patentee then states the difficulties encountered, his manner of overcoming them and the advantages arising therefrom:

> "The difficulties heretofore encountered in the application of steam to common roads are the great weight of the boiler, engine, water, and water-tanks, the complicated apparatus necessary to adapt the machine to the roughness of the roads which it must traverse, the necessity of the attendance of a skilled engineer to prevent accidents, and the unsightly appearance of the locomotives built on this plan. I have succeeded in overcoming these difficulties by the construction of a road-locomotive propelled by a liquid-hydro-carbon engine of the compression type, of a design which permits it to be operated in connection with the running-gear, so that the full carrying capacity of the body of the vehicle can be utilized for the transport of persons or goods, and which, by dispensing with skilled attendance and with steam-boilers, water, water-tanks, coal, and coal-bunkers, very largely reduces the weight of the machine in proportion to the power produced and enables me, while employing the most condensed form of fuel, to produce a power road-wagon which differs but little in appearance from and is not materially heavier than the carriages in common use, is capable of being managed by persons of ordinary skill at a minimum of trouble and expense, and which possesses sufficient power to overcome any usual inclination."

The Vital Claim

The patent then describes—as we shall later see with more particularity—the body, wheels and connections of the vehicles and the engine furnishing the motive power.

The first claim of the patent is the broadest, and the questions of validity and infringement have been presented wholly with respect to it. It is the vital claim in the case and is as follows:

> **"The combination with a road-locomotive, provided with suitable running gear including a propelling wheel and steering mechanism, of a liquid hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid-fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, and an intermediate clutch or disconnecting device and a suitable carriage body adapted to the convenience of persons or goods, substantially as described."**

The defenses are:

(1) That if the patent be broadly construed it is invalid.

(2) That if it be construed less broadly, but according to legitimate rules of construction, the defendants do not infringe.

In considering the validity of the patent, we are met, at the outset, with contentions of some of the defendants that prior uses anticipate and that that which it discloses is an aggregation rather than a combination. But the questions of novelty and invention often run together, and the inquiry whether a given association of elements is more than an aggregation is only a phase of the question of invention. We shall primarily test the question of the validity of the patent by the answer to the inquiry whether it discloses the exercise of the inventive faculties in view of the prior act.

This requires an examination of the state of the art in 1879—the date of the application and, consequently, of the alleged invention. *In tracing its development we shall find that the combination described in the claim developed, to some extent, along with its elements. But this was by no means entirely so, and we think that a correct appreciation of the subject can be best obtained by considering:

A—The development of the elements of the combination;

B—The development of the combination itself—the motor vehicle.

The Six Elements

The claim is for a combination possessing six elements:

1—"A road locomotive provided with suitable running-gear, including a propelling wheel and steering mechanism;"

2—"A liquid hydrocarbon gas engine of the compression type, comprising one or more power cylinders;"

3—"A suitable liquid fluid receptacle;"

4—"A power shaft connected with and arranged to run faster than the propelling wheel;"

5—"An intermediate clutch or disconnecting device;"

6—"A suitable carriage body adapted to the conveyance of persons or goods."

Or, departing from the language of the claim, these are the elements:

1—The carriage (including the running

FEATURE OF DECISION

"It is our opinion, for these reasons, that in this road locomotive combination embracing as its engine element an engine of the constant pressure type, the substitution in place of such engine of an engine of the constant volume type destroys the unity of the combination, because the two engines do not perform the same functions in substantially the same way. Granting the patent as broad a range of equivalents as its interpretation will permit, and giving due consideration to the degree of invention involved, still we are not able to hold that the Otto improved engine is the equivalent of the Selden engine, or that the defendants infringe by employing it as an element of their motor vehicle combination."

"While the conclusion of non-infringement which we have reached leaves the patentee empty handed with respect to his patent for the short time it has to run, it cannot be regarded as depriving him through any technicality of the just reward for his labors. He undoubtedly appreciated the possibilities of the motor vehicle at a time when his ideas were regarded as chimerical. Had he been able to see far enough he might have taken out a patent as far reaching as the circuit court held this one was. But like many another inventor, while he had a conception of the object to be accomplished, he went in the wrong direction. The Brayton engine was the leading engine at the time and his attention was naturally drawn to its supposed advantages. He chose that type. had he appreciated the superiority of the In the light of events we can see that Otto engine and adapted that type for his combination, his patent would cover the modern motor car. He did not do so. He made the wrong choice and we cannot, by placing any forced construction upon the patent or by straining the doctrine of equivalents, make another choice for him at the expense of these defendants who neither legally nor morally owe him anything.

"The decrees of the circuit court are reversed with costs and the causes remanded with instructions to dismiss the bills with costs."

*The date of the filing of the application—May 8, 1879—is prima facie the date of the alleged invention. The complainants, however, seek to overcome the presumption that that is the date and to carry it back to December, 1877. But while we have no doubt that the patentee conceived the general idea of the subject of the patent some time before he applied for it, there was no such reduction to practice or description of the whole structure as would serve to antedate the date of the application. It is true that the patentee made one of the elements of the combination—the engine—some months before he applied for the patent, but he did not make the combination itself—the road-locomotive—until many years afterwards, and that is what he claims a patent for. Moreover we fail to find that any adequate description of the combination claimed was made any substantial time before the application. But while it is well to fix a starting point, the question between the dates is of little practical importance as we find no prior use materially affecting the parent between 1877 and 1879.

GEORGE B. SELDEN'S IDEA OF APPLYING ENGINES TO SAME BODY

Herewith are reproduced comparative scale drawings showing the first Selden vehicle with the 2-horsepower engine of Selden and the Brayton, Otto, Otto-Langen and Lenoir engines installed on the same body. These drawings were exhibited by the complainants in the suit against Ford to show how the engines of Selden's forerunners would look in place of his own.

Fig. 1—Selden vehicle with the 2-horsepower Selden patent, three-cylinder engine; weight of engine, 370 pounds; speed, 500 to 600 revolutions per minute.

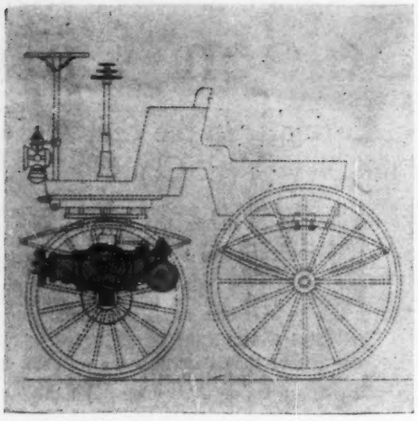


FIG. 1

gear, the body, the propelling wheel and the steering mechanism);

2—The drive (including the power shaft and connections and the intermediate clutch or disconnecting device);

3—The engine (including the liquid fluid receptacle).

The claim contains no limitations with respect to the CARRIAGE element, and the specification states that the body of the road locomotives "may be of any ordinary or desired form with any number of seats and with or without a top."

Reading the claim by itself ANY wheeled vehicle for the conveyance of persons or goods should come within its language, and the only limitation the specification could possibly impose upon it would be that the carriage should be of such a type that the engine could be located upon it without obstructing the body or platform.

So, there are no limitations in the claim with respect to the running gear, propelling wheel or steering mechanism. While the specification and drawings show particular structures, there is no suggestion that the claim is confined to any particular form. Manifestly there was nothing novel in the carriage element.

The Drive Element

With respect to the DRIVE element: the claim describes no particular form of power shaft except that it shall be so connected and arranged as to run faster than the propelling wheel. Thus any speed reducing gear between the driving and the driven shaft would come within the language used. Gearing down to gain leverage under similar conditions was, however, old in the art. Mr. Dugald Clerk—the distinguished and very competent witness for the complainants—says:

> "It was old in the art for a motive power engine to run at a greater speed than the propelling axle."

The claim likewise imposes no limitation upon the intermediate clutch or disconnecting device and such devices were old in the art in 1879. They were commonly interposed between stationary engines and the load and had been employed in steam engines; the purpose being the same as here—to permit the engine to run without driving the vehicle. The drive element of the claim was old.

The *engine* element in the claim is the one which requires the most extended consideration. It is the feature of the patent.

The engine is described in the claim as "a liquid hydrocarbon gas engine of the compression type." Being an engine of this kind it must, in the first place, be an *internal combustion engine* which (using the definitions in the complainants' brief) is an engine in which "the fuel is burned in the engine cylinder and the heat energy thereof utilized by the expanding gases acting on the piston." In the second place, it must be a *gas* engine which is "an internal combustion engine wherein the fuel is burned in a gaseous or vaporous condition." In the third place, it must be a *liquid hydrocarbon* gas engine, which is a gas engine "wherein the gaseous form of fuel is derived from a hydrocarbon liquid, such as petroleum, alcohol, etc." In the fourth place, it must be a gas engine of the *compression* type which is "a gas engine using a compressed charge of gaseous fuel" and in which, consequently, the charge-containing space back of the piston will, at the time of ignition, "receive a larger amount of fuel in relation to its size than if the fuel was admitted thereto under mere atmospheric pressure."

Now, gas engines were old at time of the application for this patent and had been used for various purposes. We shall have occasion to examine their use for propelling vehicles when we come to trace the development of the motor carriage itself. So liquid hydrocarbon engines were in use, both of the compression and non-compression types. The phrase in the claim, "a liquid hydrocarbon engine of the compression type" is descriptive of the Brayton engine, which came into use about 1873, and of the Otto compression engine which came into use a little later, but still was in the antecedent art. The Brayton was undoubtedly the leading compression engine at the time of this application, but it was later superseded by the Otto.

These two engines—the Brayton and the Otto—play important parts in this case. We shall later have occasion to examine them at length and to compare them as belonging to two well defined types of compression gas engines—the "constant pressure" type and the "constant volume" type. But it is unnecessary to describe them at this time or to define the terms which we have just employed. It is sufficient now to state the fact that the engine element of the claim—considered as an engine and not necessarily as a part of a combination—was in existence at the date of the alleged invention.

Old Combinations

To recapitulate, we have examined the prior art and have found the different elements of the combination, other than the engine, admittedly old. We have also found the engine element old and represented by two types. We

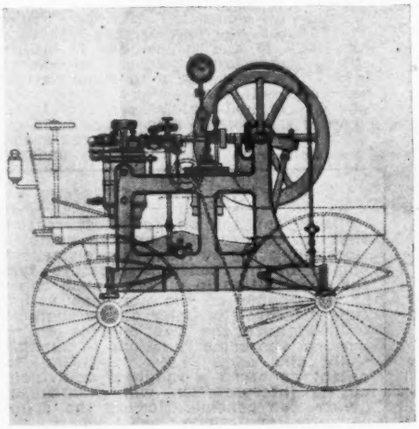


FIG. 2

must now examine the art with reference to the combination itself and ascertain what, prior to 1879, had been the development of motor vehicles, particularly those for the carrying of passengers and goods.

History of Road Vehicles

For some years subsequent to 1830 steam carriages for common roads were used to a considerable extent in England in transporting goods and passengers. But the rapid development of the railroad locomotive as well as the opposition to the use of steam vehicles upon highways soon drove them out of use, so that for many years before the application for this patent steam engines had been used upon highways in this country and in England only for traction purposes.

Gas motor vehicles came later. As we have seen, gas engines were old in the art. The first suggestion of their use to propel road carriages was in 1860 in connection with the Lenoir engine. The Lenoir patent embraced the use of liquid hydrocarbon in the form of vapor and the engine was successful for stationary purposes. It was a non-compression engine. An illustration published in Paris in 1860 showed a vehicle propelled by this engine, and it was described in various publications. If such a motor vehicle were operated, it undoubtedly ran slowly and the engine had great weight in proportion to power. But no reason is advanced why the Lenoir engine was not *capable* of propelling a vehicle.

The Mackenzie English patent of 1865, which the patent itself states was in the prior art, was for the use of steam or "compressed air or other motive power instead of steam" for driving an omnibus or carriage. The structure of this patent included the use of a geared-down chain and clutch.

The Savalle French patent of 1867 described how the Lenoir engine could be applied to road vehicles. This patent referred to the difficulty of applying such engines to light carriages.

The Kirkwood English patent of 1874 was for an engine "worked by the explosive force of a mixture of gas and atmospheric air" and which, among other uses, might "be incorporated in the structure of an ordinary tramway car or other vehicle."

The Rosenwald French patent of 1877 was for a carriage propelled by a non-compression gas engine. This vehicle had reducing gears and a clutch or "disentangler." The engine described was of the free piston type and was poorly adapted for use in a road locomotive.

Other patents are shown in the prior art—to Menn, Wilson and others. But without examining them or further considering those which we have outlined, it is clear that if there were nothing more in the case, invention would not be shown in the mere combination of (1) a carriage, (2) a drive, and (3) a gas engine, or even a hydrocarbon gas engine. The elements were old and the combination neither novel as producing any new result nor as showing any new co-operative action.

It follows, then, that if we are to find invention and novelty in the broad combination of the patent, they must be in the use of a hydrocarbon gas engine *of the compression type.*

We have seen that hydrocarbon gas engines of the compression type were old in the art and were represented by the Brayton constant pressure engine and the Otto constant volume engine. The inquiry, then, is whether either of these engines was ever combined with the other elements for propulsion purposes before the application for this patent.

Brayton Motor in Boats

The testimony shows clearly that prior to 1878 Brayton had successfully applied his engine for propulsion purposes in boats. Several launches from twenty-five to thirty-five feet in length had been equipped with and operated by them. The evidence, including sketches, shows geared down transmission, the use of disconnecting clutches and the presence of liquid fuel receptacles. Indeed if the claim be given the broad construction of covering the use of all compression gas engines, it might be read on the Brayton boat construction—if the words "motor boat" and "boat" were substituted for "road locomotive" and "carriage." Still, we appreciate the substantial difference between the problem of propelling a boat and the motor vehicle problem and are not inclined to hold that this use constituted an anticipation, although it may properly be considered in determining the question of invention.

It also appears that about 1874 Brayton used one of his engines to propel a street car upon a trial track near the city of Providence. The car was propelled back and forth over the half-mile track and up a slight grade. Some passengers were carried. There were reversing and disconnecting devices. The engine was large and heavy in proportion to the power which it furnished and—an accident taking place—it was not long used. More power in proportion to weight was necessary for commercial street railway purposes, and the plan

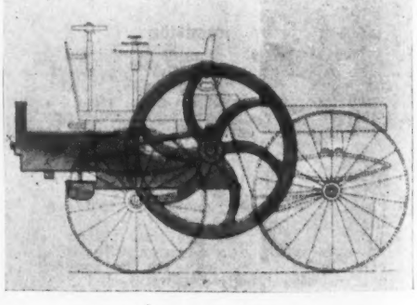


FIG. 3

DRAWINGS SUBMITTED BY COMPLAINANTS IN THE FORD SUIT

Fig. 2—Selden vehicle with 1.4-horsepower, Brayton single-cylinder engine; weight of engine, 1,160 pounds; speed, 230 revolutions per minute.

Fig. 3—Selden vehicle with 2-horsepower Otto single-cylinder engine: weight of engine, 2,000 pounds; speed, 156 revolutions per minute.

Fig. 4—Selden vehicle with 2-horsepower Otto-Langen free-piston, single-cylinder engine; weight of engine, 4,000 pounds; speed, 28 revolutions per minute.

Fig. 5—Selden vehicle with 1.85-horsepower Lenoir single-cylinder engine; weight of engine, 6,000 pounds; speed, 81 revolutions per minute.

of installing these engines was given up—financial considerations entering into its determination. But although the experiments did not develop a commercial success, they were successful from a mechanical standpoint. The engine ran the car considerable distances and carried passengers. This use was not an abandoned experiment but an abandoned attempt to induce the railway company to equip the cars with the Brayton engine. The perfected structure was capable of practical use although there was much room for improvement. It was not embryotic or inchoate. The combination of the engine, the drive and the carriage was used in public and therefore it required the use of the imitative, and not of the inventive, faculties to claim, without modification, the same combination. The use of the engine in one vehicle pointed directly to its use in another vehicle.

Brayton Engine in Omnibus

The Brayton engine was also used upon an omnibus in 1878. The weight of the testimony is that the omnibus was run by the engine a very short distance, but the experiment cannot be regarded as having been either mechanically or commercially successful. This use will not be considered as in the antecedent art.

In the state of the art thus disclosed, the patentee filed his application for a patent. As we have seen, he claimed broadly the combination of a "liquid hydrocarbon gas engine of the compression type" with the other elements. It is true that in the specifications and drawings he described and showed a particular type of engine, but he also said:

> "Any form of liquid-hydrocarbon engine of the compression type may be employed in my improved locomotive."

Taking the patent according to its terms, the case apparently presented is the ordinary one in which a patentee claims a broad invention and describes what he considers to be the best mode of applying it, but is not confined to that method. And if the prior art permitted such a patent in this case it might well be that it would be valid. But the prior art did not permit such a patent. Every element in the claim was old and the combination itself was not new. Combinations of non-compression gas engines with the other elements had been in use and Brayton had employed a "liquid hydrocarbon engine of the compression type" in a vehicle.

Even if the Brayton uses were not precisely anticipatory we can reach no other conclusion than that with them in the prior art the claim in question must be held invalid for want of invention if it be given the broad construction the language apparently calls for. Moreover, if we give it a slightly narrower construction and treat it as covering the selection of the Brayton type of compression engine, the same conclusion must be reached. Invention would not be involved in the mere choice of that type of engine, for Brayton had previously made the same selection for his street car and boats. And even if the Brayton engine had been used only for stationary purposes it is by no means certain that its mere selection for incorporation in a motor vehicle without adaptation would have involved invention.

Faure Claims a Patent

In re Faure's Appeal, 52 Off. Gaz 753 (Supreme Court, District of Columbia) is in point. In that case Faure claimed a patent for the combination of an electric motor with a vehicle. It appeared in that case, as in this, that boats had been propelled by the same kind of motor. The court said (p. 756):

> "It is made evident that the mechanical arrangements for applying the power are not new, being familiar to all experts; and that the result is not new—viz.: the movement of vehicles by electrical storage-batteries. It is admitted that Trouve had propelled boats in this way. The contention that such a use did not anticipate this application because that experiment was on water and this invention is designed for use on land seems untenable. The propulsion of vessels through water by such batteries is within the same principle as locomotion on land."

In Shaw Electric Co. vs. Worthington, 77 Fed. 992, 993, the patent was for an improvement in traveling cranes through the substitution of independent electric motors for the power previously furnished by steam power. Judge Atcheson said:

> "The facts, then, being as above stated, what element of invention is to be found in the patent here in suit? In view of the previous employment of electric motors in propelling street cars, driving machinery in mills, working elevators, etc., the mere application of electric motors to traveling cranes certainly did not involve invention, even had Shaw been the first to operate cranes electrically. The inventive faculty was no more exercised here than in a multitude of other instances in every branch of industry where the electric motor has been substituted for the steam engine or other source of power."

Indeed, Mr. Clerk, himself, says:

> "I have already stated that if the Lenoir, Brayton, Otto and Langen and Otto Silent motors were all supposed to be in active existence and running, doing stationary work, that the mere selection of one of these motors without alteration and the application of any one of them without alteration of any kind, would not involve an act of invention."

It must be distinctly borne in mind that we are not now considering the alteration of any engine for the purposes stated in the patent; the question of the superiority of a combination embracing a modified or reorganized engine, or the invention involved in making it. We are, for the time being, taking the claim as it reads in connection with the broad statement in the specification and we conclude that, taken in that way, invention is not disclosed. It should also be observed that this conclusion is not inconsistent with a holding that the patent is valid upon its face. The antecedent art as shown by the testimony goes far beyond that disclosed by the patent or that of which the court could take judicial notice.

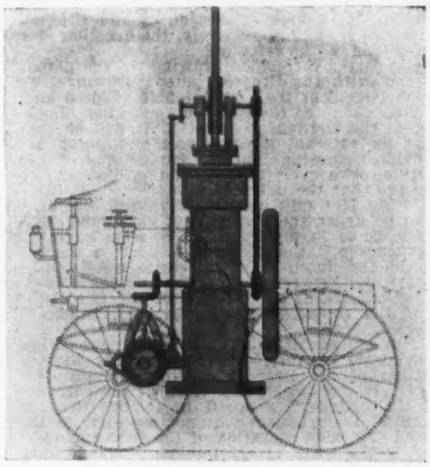


FIG. 4

But we are reluctant to so construe the claim that it must be held invalid for want of invention. We are of the opinion that the patentee had ideas ahead of the times and appreciated many aspects of the problem to be solved in creating a practical motor vehicle. Reading his statement of the difficulties encountered, his manner of meeting them, and the advantages of his discovery, we think it evident that he understood that an engine suitable for a light vehicle could not be taken bodily from the prior art and used without change, but that modification and adaptation were required. In our opinion the statement in the patent that any form of compression engine may be employed is inconsistent with the intention disclosed by the patentee in the patent as a whole and should not have too much stress laid upon it. We also think that we should examine the specification, including the drawings and the model, to determine whether the patentee in addition to expressing the need of adapting an engine to the purposes of a motor vehicle shows that he actually adapted one. It may well be that the claim is limited by the specification should be held to be valid.

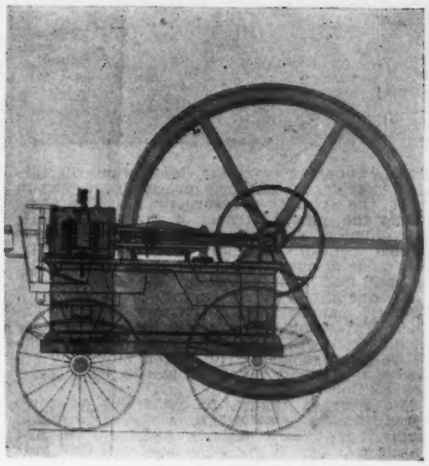


FIG. 5

As already shown, the patentee states at the commencement of his patent that the object of his "invention is the production of 1, a safe, 2, simple and 3, cheap road locomotive, 4, light in weight, 5, easy to control, and 6, possessed of sufficient power to overcome any ordinary inclination."

He then, as shown in the extract from the patent quoted at the beginning of this opinion, points out the difficulties involved in the use of steam engines upon common roads and states that he has overcome them by his road locomotive propelled by his liquid hydrocarbon engine of the compression type.

Advantages of Invention

He next states that the advantages of his invention are:

1. Dispensing with steam boilers, coal and water and the structures necessary to their use, and employing a condensed form of fuel, thereby reducing the weight of the machine in proportion to the power produced.
2. Producing a power road wagon light in weight; capable of being managed by persons of ordinary skill, and having sufficient power for ordinary purposes.

The patentee also describes with reference to the drawings the body of the road locomotive, the driving wheels, the clutches, the gearing, the springs, the fifth wheel, the steering device, the brake and other parts of the structure and also indicates the preferable locations of various devices and preferable methods of connection.

The patentee describes with reference to the drawings the engine element, pointing out, 1, the air reservoir; 2, the air pump; 3, the working cylinder; 4, the inlet valve; 5, the camshaft; 6, the combustion chamber, and other details. He also briefly describes the operation of some of the different parts. The description, however, both of the construction and operation of the engine, is quite incomplete. This was appreciated by the patentee, for he concluded his description by saying:

> "As the general construction and mode of operation of liquid hydrocarbon engines of this class are well known, it is considered unnecessary to further describe them here."

As the patentee thus refers to the existing art for a more complete description of his compression engine and as we have ascertained that there were two different types of compression engines in the art represented respectively by the Brayton and Otto engines, we must now find what those types were in order to determine which the patentee selected.

Two Motor Types

The two types are called respectively the *constant pressure* type and the *constant volume* type. Although these terms may have originated since the date of the invention, they correctly describe the types or classes of compression engines then in existence. No better explanation of them can be found than in Mr. Clerk's work entitled "The Gas Engine," which was published in 1887, and which has been offered in evidence. In this book he also shows the construction and working processes of the two types of engines and the differences between them, as stated in the foot note.*

*In his book (p. 29) Mr. Clerk divides his gas engines according to their working processes into three well defined types:

"1. Engines igniting at constant volume, but without previous compression;

"2. Engines igniting at constant pressure with previous compression;

"3. Engines igniting at constant volume, with previous compression."

It is not necessary for the purposes of this case to examine the operation of the first type, the non-compression engine. With respect to the

It is apparent from the descriptions in this work that a constant pressure engine is one in which the cylinder pressure remains the same during the outward travel of the piston while the volume of flame increases. The pressure is applied continuously and not spasmodically. This mode of operation is also called "slow combustion" and "non-explosion."

A constant volume engine operates in a different manner from a constant pressure engine. The volume during ignition theoretically remains constant; the pressure increases. The action is spasmodic. The piston moves by explosive action and is kept in motion by a series of explosions.

The Brayton engine, to which we have referred, was a constant pressure compression engine. Mr. Clerk says in his book (p. 32) that it was one of the most successful of that kind and also said (p. 154):

> "The engine worked well and smoothly; the action of the flame in the cylinder could not be distinguished from that of steam; it was as much within control and produced diagrams quite similar to steam."

And in Prof. Thurston's contemporaneous report (1873) concerning the Brayton engine, quoted in Mr. Clerk's book (p. 157), it is said:

> "The operation of the engine is precisely similar in the action of the engine proper and in the distribution of pressure in its cylinder to that of the steam engine. The action of the impelling fluid is not explosive, as it is in every other form of gas engine of which I have knowledge."

The Otto Engine

The Otto engine, on the other hand, was a constant volume compression engine. Although the leading idea of compression and ignition at constant volume had been suggested before the time of this engine, Otto seems to have successfully applied it and his engine came into general use. This engine was operated by a series of timed explosions and, as we shall later see, was the prototype of the modern automobile engine.

It is clear from this examination that the statement heretofore made that the Brayton and Otto engines differed in being respectively constant pressure and constant volume engines is sustained by the record.* They also differed in another important particular. The Brayton was a two cycle engine. The Otto was a four cycle engine. Turning to the complainants' definitions we ascertain that "a cycle is a series of movements composing one complete operation," and that the following is a definition of the term *"two cycle engine"*:

> "An engine whose operation is completed by *two* strokes, viz: a power stroke and a scavenging or exhaust stroke. If of the compression type the power stroke simultaneously compresses the charge for the next power stroke, the charge thus compressed being admitted to the cylinder at the end of or during the scavenging or exhaust stroke."

The term *"four cycle engine"* is thus defined:

> "An engine whose operation is completed in *four* strokes. Always of the compression type. First stroke sucks in the gaseous charge at atmospheric pressure; second stroke compresses the charge; third stroke is the power stroke; fourth is the scavenging or exhaust stroke."

The compression stroke in the two cycle engine of the earlier art usually compressed the charge into an intermediate receiver from which it was admitted in a compressed state to the cylinder. This was the construction of the Brayton engines which were provided with outside mechanism in which compression took place before the charge was let into the cylinder. The four cycle engine, on the other hand, as represented by the Otto engine, had no such intermediate receiver. The single cylinder served alternately the purposes of motor and pump and the charge was also compressed in it.

Now as the patentee in effect referred to an existing compression engine to supply the deficiencies in his description and as the two existing types are represented by the Brayton and Otto engines respectively, the question is—which one did he refer to?

Comparing the engine drawings of the patent in suit with the Brayton patent drawings, we think it evident that the patentee adopted and, perhaps, adapted the Brayton apparatus. Looking at the written specification it will be seen that an external air reservoir and pump are provided, showing that the engine was of the Brayton two cycle type. Reading further, we observe that the patentee says:

> "As it would be decidedly inconvenient to be under the necessity of extinguishing the flame in my improved traction engine whenever it was required to make a short stop the clutch Y (or the clutches j j') interposed between the engine and the driving wheels, so as to admit of the running of the engine while the carriage remains stationary."

This constantly burning flame (or other continuous ignition) was necessary to the operation of the Brayton constant pressure engine. It was the "living torch at the entrance of the cylinder" referred to in the Brayton patent. Its existence was not essential to the timed explosion operation of the Otto engine.

So without any expert opinion we should have no difficulty in determining that the engine of the patent is of the Brayton two cylinder constant pressure type. And the testimony even of the complainants' expert is to the same effect. Mr. Clerk said in his testimony that the reference in the patent to existing well known engines was to the Brayton constant pressure engine.

He also said in his report to the complainants' counsel, after referring to the description in the patent:

> "Stopping at this point it is necessary to recognize what type of engine is indicated. About this I have no difficulty whatever. I at once recognize it as an engine of the Brayton type operating on the constant pressure cycle. Athough no description is given in the specifications anyone familiar with Brayton engines can see the air pump of smaller capacity than the motor cylinder, the air reservoir containing air compressed by the pump and the inlet valve admitting air to the cylinder. * * * Altogether I have no difficulty in seeing that the intention of the inventor is to operate by the constant pressure method, although he does not say so specifically."

It cannot, therefore, be questioned that the engine which the patentee referred to in the patent for the completion of his description was the Brayton engine. The Brayton mode of operation was adopted by reference as the Selden mode of operation and this method, as we have already seen, was the constant pressure, two-cycle method.

The next question is, what modifications does the patent show that Selden made in the Brayton engine?

The Brayton patents and the testimony concerning the actual Brayton engines show that they were heavy and cumbersome in proportion to the power furnished. While such an engine did run a street car, it occupied considerable space, and a still larger and heavier engine would have been necessary to furnish sufficient power for the practical needs of the railway. The engines were poorly adapted for use in a vehicle upon common roads. When capable of furnishing sufficient power they were too heavy and the reciprocating parts occupied too much space.

The Selden Motor

The written description of the patent, read in connection with the drawings, shows fairly that Selden made material improvements upon the Brayton structure in order to adapt it to the purposes of a road vehicle.

1. The drawings show that the Selden engine has an enclosed crank chamber, it being a continuation of the working chamber. It is true that the only function of the enclosed crankcase mentioned in the written specification is that of a cooling chamber. But it *is* referred to and it is clearly shown in the drawings so that we think the patentee entitled to claim as a feature of his patent any benefits necessarily accruing from its use. We are also satisfied that the use of the enclosed crankcase rendered unnecessary the heavy bed plates of the former Brayton construction and enabled the patentee to dispense with other heavy and cumbersome parts outside the casing of the cylinder.

2. We also think it is the better view that Selden by his alterations increased the speed capabilities of the Brayton engine. Higher speed was obviously necessary for the purposes of a light road vehicle, and it was such a vehicle that it was the object of the patent to produce. The elimination of cumbersome working parts by the use of an enclosed crankcase necessarily increased, to some extent, the capacity for speed. The plurality of cylinders referred to, but not required by, the specification and shown in the drawing produced, in the arrangement shown, continuous turning power and increased the speed possibilities over the old Brayton construction. The gearing ratio—the proportion of stroke to volume of cylinder—shown in the drawings, but not mentioned in the written specification, also gave increased speed.*

The Selden Improvements

The improvements, then, which Selden made in the Brayton engine had these results:

a. Decrease in weight in proportion to power produced;

b. Decrease in bulk in proportion to power produced;

c. Increase in speed.

To make these improvements we think that something more than mere mechanical skill was required and, in view of the superior efficiency of the engine for the purpose for which it was designed, we hold that invention was involved. The complainants are probably right in saying in their brief:

> "He (Selden) was compelled to materially reorganize the Brayton engines of the prior art even to such an extent that a separate engine patent would have been fully justified by the degree of invention involved."

Selden did not, however, obtain a patent for his improvement upon the Brayton engine, but made the improved engine an element in his road locomotive combination. But no new coordinate action of the members of the combination is shown. The improved engine furnished the power and the other elements cooperated with it in the same way that similar elements had co-operated with the older engines. The superior results would seem to have

second type—the constant pressure compression engine, Mr. Clark says (p. 31):

"In it the engine is provided with two cylinders of unequal capacity; the smaller serves as a pump for receiving the charge and compressing it, the larger is the motor cylinder, in which the charge is expanded during the ignition and subsequent to it.

"The pump piston, in moving forward, takes in the charge at atmospheric pressure, in returning compresses it into an intermediate receiver, from which it passes into the motor cylinder in a compressed state. A contrivance similar to the wire gauze in the Davy lamp commands the passage between the receiver and the cylinder, and permits the mixture to be ignited on the cylinder side as it flows in without the flame passing back into the receiver.

"The motor cylinder thus receives its working fluid in the state of flame, at a pressure equal to, but never greater than, the pressure of compression. At the proper time the valve between the motor and the receiver is shut, and the piston expands the ignited gases till it reaches the end of its stroke, when the exhaust valve is opened, and the return expels the burned gases.

"The ignition here does not increase the pressure, but increases the volume. The pump, say, puts one volume or cubic foot into the receiver; the flame causes it to expand while entering the cylinder to two cubic feet. It does the work of two cubic feet in the motor cylinder, so that, though there is no increase of pressure, there is, nevertheless, an excess of power over that spent in compressing."

With respect to the constant volume compression engine, Mr. Clerk says (p. 33):

"The compression cylinder may be supposed to take in the charge of gas and air at atmospheric temperature and pressure; compress it into a receiver from which the motor cylinder is supplied; the motor piston to take in its charge from the reservoir in a compressed state; and then communication to be cut off and the compressed charge ignited.

"Here ignition is supposed to occur at constant volume, that is, the whole volume of mixture is first introduced and then fired; the pressure, therefore, increases. The power is obtained by igniting while the volume remains stationary and the pressure increases.

"Under the pressure so produced, the piston completes its stroke, and upon the return stroke the products of the combination are expelled."

*We shall continue the examination of the differences between these engines when we consider the question of infringement.

*The rule is, of course, appreciated that while the drawings of a patent serve to make plain doubtful or ambiguous statements in the written description, they cannot go further and supply the entire absence of the written description required by the statute. A strict application of this rule would probably prevent us from considering what the drawings show concerning the gearing ratio or the working of the cylinders—those subjects not being mentioned in the description. But in view of the stated objects of the patent and in view of the fact that changes in the Brayton structure referred to in the description tend to increase speed capabilities, we have thought that the rule should not be strictly applied in this case and that some weight should be given to what the drawings disclose in that direction, as supplementing the written description and not altogether as supplying its absence.

arisen from the superiority of the engine element alone. But it is not necessary to determine whether the associated action, as such, produced a new and useful result. It is sufficient to sustain the claim to hold that the combination embraced a novel element. The claim is held to be valid as covering a combination in a road locomotive of the different elements with a liquid hydrocarbon compression engine of the Brayton type; the limitation to this type being read into the claim by the specification to save it from invalidity.

It must be understood, however, that we do not sustain the claim upon the theory that Selden invented a light engine, an engine of small bulk or an engine of high speed, using those terms absolutely. We have made comparisons with, and have considered improvements upon, the Brayton engines only. Compared with them, we think the Selden engine lighter, less bulky and of higher speed. But we are not at all convinced that the Selden engine operating according to the Brayton or constant-pressure method would be a high speed engine as compared with one operating according to the explosive method. Constant pressure involving slow combustion seems consequently to involve slow operation.

The complainants urge that it places too narrow a construction upon the claim to limit it to a combination of which the engine element is an improved Brayton engine. They say that the improvements upon the Brayton engine which Selden shows in his patent merely *illustrate* the alterations and changes required by compression engines generally to fit them for the purposes of a light road vehicle. They say, in effect, that the engine element of the claim is any compression engine which has been adapted to vehicular purposes by changes similar to those made in the Brayton engine.

But we have been able to find that Selden reorganized the Brayton engine only by making close comparisons with that particular construction. We have nearly broken established rules by looking at the drawings by themselves to ascertain the changes made in that engine. There is little enough to be found about the improvements to it and nothing at all about the alterations of other engines. The patent does not pretend or attempt to lay down any rule for reorganizing compression engines to fit them for vehicular purposes. It does not say that other kinds of engines than the Brayton type require changes. It does not say that the changes made in the Brayton engine could be made in other engines or that if made, they would fit them for use in motor vehicles. No one could learn from the patent whether the Otto engine could be constructed with an enclosed crank chamber or whether the substitution of the gearing ratio shown in the drawing would increase or diminish its speed. With the patent before a person skilled in the art, experiments, certainly, and invention, not improbably, would have been necessary to determine the steps required to reorganize the Otto engine.

Patent Involves Solution

A patent is granted for solving a problem not for stating one. Its description must explain the invention itself, the manner of making it and the mode of putting it in practice. In the absence of knowledge upon these points the invention is not available to the public without further experiments and further exercise of inventive skill. A claim for a combination which embraces an element only in case it is made capable of being employed in the combination and without disclosing means of adapting it discloses nothing definite. The question remains, What engine is capable of being combined in a road vehicle? What changes are necessary to adapt it to the purpose? How are these changes to be made? If we were to construe the claim as the complainants urge, we should be obliged to go further and hold it uncertain, indefinite and, consequently, invalid.*

For these reasons we must hold that the claim of the patent, limited by the specification in the manner shown, is valid unless, indeed, we are satisfied that the patented structure was inoperative and without utility. But, without discussion, it is sufficient to say that we have no doubt that an engine constructed according to the teachings of the patent with its references to the Brayton engine would, in combination with the other elements, run a road vehicle. We think that the patent discloses an operative structure and that is sufficient. The defense of want of utility is not sustained. But any contention that a motor vehicle constructed by the patentee according to the teachings of the patent operated so successfully as to demonstrate that Selden had solved a great problem and is entitled to the status of a pioneer inventor is, we think, without foundation.*

We come now to the question of infringement and as it is conceded that the defendants use a combination embracing all the elements of the claim other than the engine element, and as it is also conceded that they use an engine of some kind in connection with such other elements, the question of infringement resolves itself into the inquiry whether their engine is a modified Brayton engine or its equivalent.**

But before we enter directly upon this inquiry we should briefly examine the development of the modern automobile and ascertain from what source the engines of the defendants' type were obtained and, especially, whether they were borrowing from Brayton and Selden.

Real Cars in 1889

We have already noticed the motor vehicles of the art prior to 1879. Much had been attempted and little accomplished. Indeed, it was not until about ten years later, at the time of the Paris Exposition of 1889, that the real automobile art may be said to have begun. At that exposition a Benz automobile was exhibited and, later, the public interest was stirred by the Paris-Rouen race. In this country public attention was first called to the automobile by the Daimler exhibit at the Columbian exhibition in Chicago in 1893, and in 1895 the Times-Herald automobile race took place in Chicago. The pioneer inventors appear to have been Daimler and Benz abroad and Duryea, Olds and Ford (and perhaps one or two others) in this country.

These inventors selected for their automobiles the Otto compression engine. They did not select the Brayton engine and, indeed, as Mr. Clerk says, the Brayton engine had practically disappeared from the market in 1889. Thus in their original type of engine they borrowed nothing from Brayton and, of course, they could have actually borrowed nothing from Selden because his patent was not issued until 1895.

In some of the first automobiles the engine was located on the axle as shown in the Selden patent. But this location below the springs caused too much jar to the machinery and was soon abandoned.

The Otto compression engine selected by these inventors has been modified and changed in its development into the modern automobile engine and adjuncts of importance have been added. But none of these changes was in fact taught by the patent in suit nor could many of them have been taught by it had it been issued. And the possible changes which it did indicate were suggestive merely.

Otto Four-Cycle Engine

The Otto compression engine did not at first employ electric ignition. A flame with a moving slide produced the timed explosions. Electric ignition was considered impracticable. But when the electric art had developed it was seen that the electric ignition could be made superior to flame ignition and would permit much higher speed. But the change was not indicated by the Selden patent which refers only to flame ignition.

The inventors added a carbureter to the Otto engine in which the charge of gasoline and air was mixed in exact proportions before it was conducted to the cylinder for compression. In the engine of the patent the air vaporizes the gasoline in the passage leading to the cylinder and the proportions necessarily vary. The patent in no way pointed in the direction of the carbureter.

When the inventors began to adapt the Otto engine to the purposes of a road engine the desirability of lightness was apparent and changes were made in the bed and castings so that the engine could be supported upon a steel frame instead of upon the heavy foundations used in stationary work. Other changes in the direction of decreasing weight and bulk and increasing speed were made. But these inventors were actually taught nothing in these matters by the Selden patent and if it had been before them they would, as we have seen, have learned nothing definite from it.

We thus find that the defendants use an improved Otto engine which retains the principle of that type and is, in its essentials, a four-cycle constant volume (or explosion) compression gas engine. Obviously it is not identical with Selden's improved Brayton engine, which is a two-cycle constant pressure (or slow combustion) compression gas engine; and so the final question is whether they are, under the patent, equivalents.

It is, of course, clear that an inventor is not limited to the particular structure illustrated in his patent as the best form known to him provided his claim is broad enough to cover other or equivalent forms. If the claim in the present case could have been sustained as covering a combination of any hydro-carbon gas engine of the compression type with the other elements, the description in the specification of the modified Brayton engine would have been considered as a statement of the inventor's idea of the best form, but he would not have been confined to it, and the Otto improved engine would unquestionably have infringed. But we were unable to sustain the claim as so construed and could only hold it valid as being limited to a combination in which a Brayton modified or reorganized engine should be a member. The patent as so construed necessarily permits only a very limited range of equivalent forms. Being confined to an engine element of a particular class or type, an engine of another class seems almost barred by the interpretation itself. Still, classification might be based upon matters of form and not of substance. The elements of the combination are things and not names. In this

*Any force whatever in the complainants' contention must grow out of the presence in the patent of the statement to which attention has already been directed that "any form" of compression engine may be employed. But just as we found that by giving those words their natural meaning the patent would be made so broad and sweeping as to be invalid in view of the antecedent art, so if we construe them as meaning "any adaptable engine" or "any engine which has been adapted" we make the patent indefinite and invalid. If the patent is to be sustained the language in question must be given a limited application. Under all the conditions we think that it should be construed as meaning merely that the patentee does not confine himself to any particular form or detail of the Brayton type of engine.

*While the testimony with respect to the Selden vehicles constructed to illustrate the patent is sufficient to negative inoperativeness, it fails to show such practical success as to broaden the scope of the invention, and certainly does not disclose invention in and of itself. We should be unable to sustain the patent upon any such theory as that advanced by the complainants' experts that Selden's invention consisted in producing "a successfully operative vehicle" or "as a new result," "a practically unobstructed vehicle capable of great range of action." Of course, the vehicle had to be successfully operated in the sense of showing utility to make the patent valid, but that result did not show invention and novelty. Those essentials we were able to find only elsewhere. Moreover, the result of obtaining a practically unobstructed vehicle arose from the location of the engine upon the axle which the defendants have not adopted and that feature is not put forward in the complainants' brief as being essential to the invention. And, furthermore, we are not at all convinced by the testimony concerning the vehicles in question—even assuming that their construction followed the teachings of the patent and nothing besides—that they showed capability for commercial use or possessed great range of action.

**A distinction is made by the Judge of the Circuit Court in considering the question of infringement, which we think is not well founded. He says in his opinion:

"Defendants seem continually to assume (without saying so) that Selden invented nothing more than a modified Brayton engine and then assert that they do not infringe because they do not use that particular motor and do use a modified Otto. They admit that the claim is for a combination, but continually seek refuge in defenses that would be good against any patent on Selden's engine but are worthless against the combination if it be patentable at all."

Undoubtedly a patent upon a combination may be broader than a patent upon any or all of its elements. The members may co-operate to produce a new and beneficial result or operate according to a novel method. But it is not clear that any novel co-operative action is shown in the present case and whatever new and beneficial result was produced by the combination seems clearly to have arisen from the superiority of the engine element alone. It has seemed well settled in the case that that which the patentee invented and used in his combination was a modified Brayton engine. There would have been no invention in combining an unmodified Brayton engine with the other elements.

But all this is beside the question of infringement. Even if it be conceded that the combination patent has a different scope than a patent for an improved Brayton engine would have had, it is none the less true that if the defendants do not use the modified Brayton engine and do use the modified Otto engine, they escape infringement unless the latter is an equivalent of the former. It is well settled that to establish the infringement of a combination, the use of every element of the combination must be shown.

as in other patents for combinations we think that the unity of the combination will not be affected by the substitution of elements which, however they may be classified or designated, perform the same function in substantially the same way, while it will be destroyed by the substitution of elements which do not perform the same office in substantially the same manner.

We must, then, consider the materiality of the differences between engines in question. We have already seen that broad differences exist and must now determine their nature and extent. In giving weight to dissimilarities—in saying what are substantial and what relate merely to form—we must consider the degree of invention shown in the patent, although we will be unable to disregard differences as in the case of a patent of a primary character. And we think this means in the present case that the patent is entitled to a fair and reasonable but not broad range of equivalents. What is a fair and reasonable range can better be determined in the concrete comparison rather than in the abstract definition.

Compares Engines

A close comparison of the engines shows many differences. Some are obviously mere differences in shapes and designs and may be at once disregarded. The following are those which appear to be the most material:

1—The Selden engine has external compression mechanism with a compressed air reservoir, while the defendants' engine has no such external mechanism, but compacts the charge in the working cylinder. Were the compression of the charge the only object to be accomplished, undoubtedly the gas and air could as well be compressed to the requisite degree before entering the cylinder as by compression in the cylinder itself. And even if internal compression gave superior results it is probable that the one method would be the equivalent of the other. But if and in so far as outside compression is essential to a constant pressure engine, inside compression cannot be regarded as its equivalent unless we determine that the distinction between constant pressure and constant volume engines should be disregarded.

2—The Selden is a two cycle engine. The defendants' engines are four cycle. The Selden engine compresses into an outside chamber simultaneously with its power stroke and with the next stroke drives out the burnt gases. Every second stroke is a power stroke. The defendants' engine draws in the charge with the first stroke and compresses with the second. The third stroke is the power stroke and the fourth sweeps out the burnt gases. Every fourth stroke is a power stroke. But the first two strokes of the defendants' engine are merely pumping and compressing strokes and were the question here between a two cycle explosion engine and a four cycle explosion engine, we should have little difficulty in finding the one the equivalent of the other.

3—The Selden engine burns the charge as mixed at the entrance to the cylinder, while the defendants' engine compresses and mixes the charge inside the cylinder. The result in the latter case is that by the compaction in the cylinder after admission the mixture is brought into a homogeneous state, while in the former case the gas and the air burn at the inlet to the cylinder in a more or less non-homogeneous state with the pressure behind them. The materiality of this difference in operation, however, lies in the fact that the one form is that of the constant volume engine; the other, of the constant pressure engine.

4—The Selden engine has no distinctive external vaporizing device, while, as we have seen, the defendants' engine is equipped with a carbureter which determines the proportions of the mixture to be admitted to the cylinder and also increase its homogeneity. But by the construction shown in the patent the air vaporizes the hydro-carbon in the passage leading to the cylinder and we think the carbureter, while undoubtedly an adjunct of great importance and advantage, should be held not beyond the range of equivalents.

5—The Selden engine has constant flame ignition, while the defendants' engine has timed electric ignition. Probably continuous electric ignition would be the equivalent of constant flame ignition, but whether intermittent or timed ignition, which is an essential feature of the constant volume engine, is the equivalent of continuous ignition depends altogether upon whether the constant pressure engine.

So, lastly, we reach the question: **Is the constant volume engine the equivalent of the constant pressure engine, under a patent, entitled to a fair and reasonable, but not broad, range of equivalents?**

This is not a question of differences in terminologies or theories. It is a question of differences in principles and things. It is wholly immaterial whether the terms "constant pressure" and "constant volume" were in use when the patent was first applied for, or when or by whom they were first employed. It is equally immaterial whether we use those terms at all. We might just as well use the term "explosion" and "non-combustion" to designate the two types and, indeed, have repeatedly used them in this opinion. But the terms "constant pressure" and "constant volume" are convenient phrases which in themselves indicate methods of operation and they are used in Mr. Clerk's book to which we have referred and shall refer. So, athough laying no stress whatever upon the mere names, we shall continue to use them.

It is also immaterial that by omitting the bypass which furnishes a constant supply of gas; by changing the timing of valves and by using timed ignition, a constant pressure engine might be converted into a constant volume engine. The required alterations are by no means trivial and the actuality of differences in principles and methods is not changed by the readiness by which they may be eliminated.

There is another matter which is also without importance. It is immaterial that a constant volume engine, under extraordinary conditions and with unusual adjustments, may be made to approximate the action of a constant pressure engine or that a constant pressure engine under like conditions and adjustments may be made to approximate the action of a constant volume engine. The question is whether in their regular methods of operation the two types of engine are so similar as to be substantial equivalents.

Turning again—with the risk of repetition—to Mr. Clerk's book, we find that in addition to his classification of compression engines as shown in the extract already quoted, he says, in speaking of the constant pressure type (p. 152):

> "In engines of this kind compression is used previous to ignition, but the ignition is so arranged that the pressure in the motor cylinder does not become greater than that in the compressing pump. The power is generated by increasing volume at a constant pressure. Engines of type II (consant pressure engines) are therefore:
>
> "Engines using a mixture of inflammable gas and air compressed before ignition and ignited in such a manner that the pressure does not increase, the power being generated by increasing volume.
>
> "These engines are truly slow combustion engines; in them there is no explosion.
>
> "The most successful engine of the kind is an American invention; although proposed in 1860 by the late Sir William Siemens, it was never put into practicable workable shape till 1873, when the American, Brayton, of Philadelphia, produced his well known machine."

And his type III or constant volume type, Mr. Clerk further says (p. 165):

> "Engines of this kind resemble those just discussed in the use of compression previous to ignition, but differ from them in igniting at constant volume instead of constant pressure; that is, the whole volume of mixture used for one stroke is ignited in a mass instead of in successive portions.
>
> "The whole body of mixture to be used is introduced before any portion of it is ignited; in the previous type (constant pressure type) the mixture is ignited as it enters the cylinder, no mixture being allowed to enter except as flame. In type III the ignition occurs while the volume is constant; the pressure therefore rises; it is an explosion engine, in fact, like the first type (non-compression), but with a more intense explosion due to the use of mixture at a pressure exceeding atmosphere.
>
> * * * * * * *
>
> "In the third type are included all engines having the following characteristics, however widely the mechanical cycle may vary:
>
> "Engines using a gaseous explosive mixture, compressed before ignition and ignited in a body, so that the pressure increases while the volume remains constant. The power is obtained by expansion after the increase of pressure."

Mr. Clerk considered these differences between constant pressure and constant volume so important that he made them *the basis of classification* in his book and notwithstanding his present testimony, we must regard them as substantial.*

*Mr. Clerk uses the word "type" in his book in the sense of "kind" or "class." Thus he points out several different varieties of the different classes of engines. As we have quoted freely from the book we have, to avoid confusion, used the same word in the same seuse.

It is true, as stated in the opinion of the judge at circuit, that in all internal combustion engines the result of expanding in any way the gaseous fuel is the driving of the piston, but the method of operation is not the same when it is driven by explosive action as when it is driven by slow expansion. So in all compression gas engines the charge is compressed before ignition but the compression of the whole charge and its instantaneous firing at the moment of greatest compaction is a very different thing from the ignition of successive compressed portions—particle after particle—as they enter the cylinder. In the latter case the force upon the piston is progressive—"the action of the flame in the cylinder could not be distinguished from that of steam" (Mr. Clerk's book, p. 154)—while in the former the force is spasmodic and explosive. *These are differences in principles and methods of operation. And these differences in principles and methods are substantial.* We are satisfied that the slow combustion method necessarily involves slow operation; not only because of the time required for combustion between strokes, but on account of the comparatively non-homogeneous character of the mixture. We are satisfied that it gives less power in proportion to the size of the engine than the explosion method.*

Not Like Otto

It is our opinion, for these reasons, that in this road locomotive combination embracing as its engine element an engine of the constant pressure type, the substitution in place of such engine of an engine of the constant volume type destroys the unity of the combination, because the two engines do not perform the same functions in substantially the same way. Granting the patent as broad a range of equivalents as its interpretation will permit, and giving due consideration to the degree of invention involved, still we are not able to hold that the Otto improved engine is the equivalent of the Selden engine or that the defendants infringe by *employing it as an element of their motor vehicle combination.*

Let us briefly notice the consequences of an opposite conclusion. The Otto engine was in the prior art. Assuming that it was not adapted for propulsion purposes in a light vehicle, it would seem clear that the first person who showed invention in reorganizing and adapting it would have been entitled to a patent for the improvement and, with Otto's permission, could have used the improved engine in a vehicle. Similarly it would seem that he might have obtained a patent for a combination embracing the improved Otto engine as an element. But these things could not have been done if infringement is shown in this case. Selden, although selecting the Brayton engine, which was designed to avoid the explosive type, yet pre-empted the field and prevented all improvements for propulsion purposes in that type.

Selden's Choice Unfortunate

While the conclusion of non-infringement which we have reached leaves the patentee empty-handed with respect to his patent for the short time it has to run, it cannot be regarded as depriving him through any technicality of the just reward for his labors. He undoubtedly appreciated the possibilities of the motor vehicle at a time when his ideas were regarded as chimerical. Had he been able to see far enough he might have taken out a patent as far-reaching as the Circuit Court held this one was. But like many another inventor, while he had a conception of the object to be accomplished, he went in the wrong direction. The Brayton engine was the leading engine at the time and his attention was naturally drawn to its supposed advantages. He chose that type. In the light of events we can see that had he appreciated the superiority of the Otto engine and adapted that type for his combination, his patent would cover the modern automobile. He did not do so. He made the wrong choice and we cannot, by placing any forced construction upon the patent or by straining the doctrine of equivalents, make another choice for him at the expense of these defendants, who neither legally nor morally owe him anything.

The decrees of the Circuit Court are reversed with costs and the causes remanded with instructions to dismiss the bills with costs.

*Explosive action was the very thing which Brayton, who invented the engine which Selden modified, desired to avoid. In his foundation patent of 1872, in speaking of the long, slow-burning operation of the combustible, he says:

"While in the state of expansion consequent upon ignition it (the flame) exerts, not a spasmodic or explosive force upon the piston at the very commencement of its stroke when the expanding gas begins to act upon it, and the quantity of gaseous mixture during its period of admission is in proportion to the extent of the movement of the piston and is put into the state of expansion upon passing the interceptors."

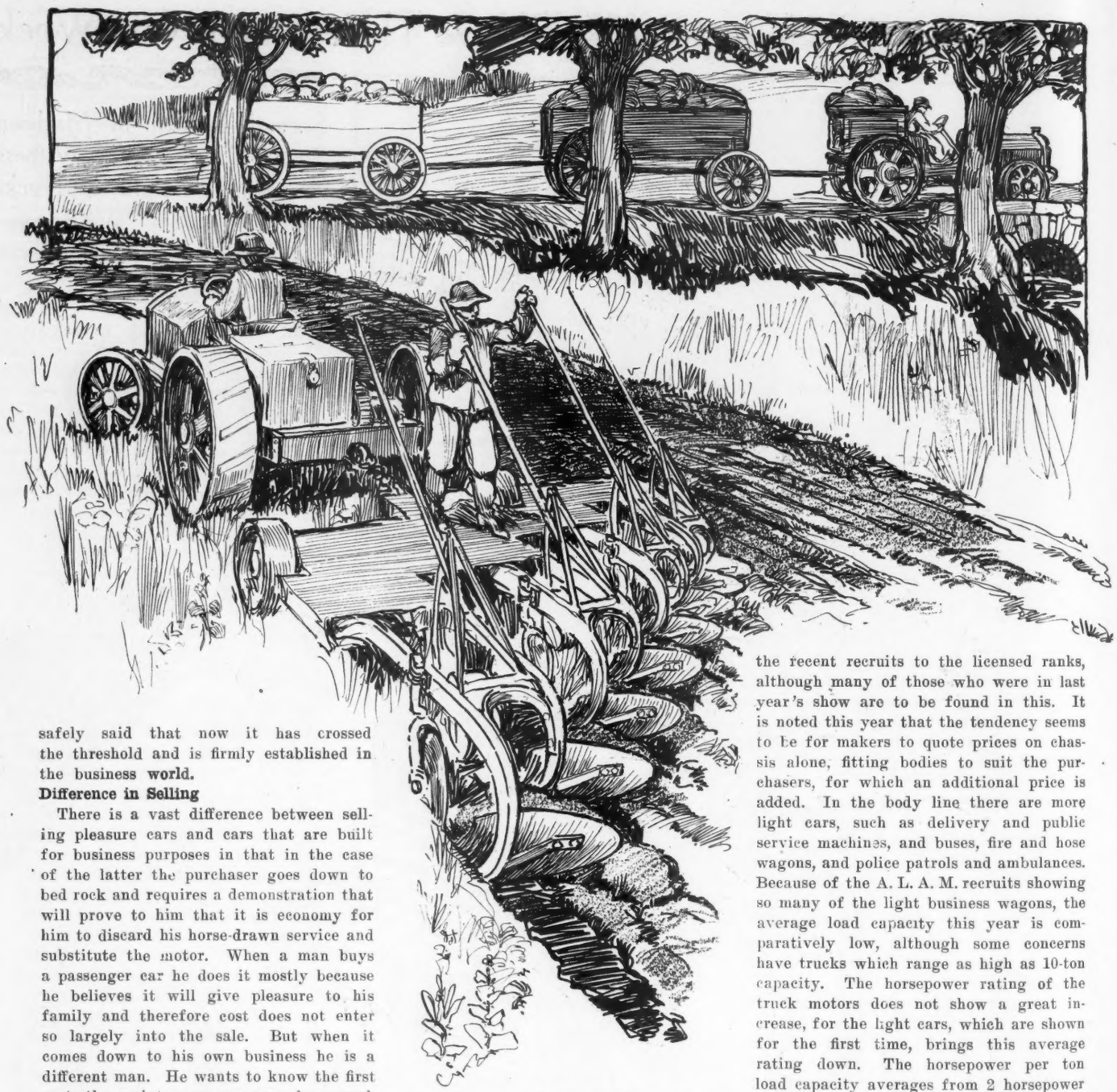
The statement concerning Brayton in "Engineering" for February, 1877, seems well founded:

"He turned his attention to the design of an engine in which an explosive mixture could be gradually consumed without the ordinary explosive action."

Commercial Motor Cars Will Have Their Inning Next Week

Second Session in Madison Square Garden Will Witness Remarkable Display of Trucks and Delivery Wagons—Average A. L. A. M. Vehicle

ALL previous displays of commercial motor vehicles have been simply dress rehearsals for the big show which opens in Madison Square garden on the night of January 16, not even excepting the first strictly motor truck and light delivery display that was made in Chicago in December, 1907. This branch of the industry has been feeling its way, cautiously and conservatively, ever since and it can be



safely said that now it has crossed the threshold and is firmly established in the business world.

Difference in Selling

There is a vast difference between selling pleasure cars and cars that are built for business purposes in that in the case of the latter the purchaser goes down to bed rock and requires a demonstration that will prove to him that it is economy for him to discard his horse-drawn service and substitute the motor. When a man buys a passenger car he does it mostly because he believes it will give pleasure to his family and therefore cost does not enter so largely into the sale. But when it comes down to his own business he is a different man. He wants to know the first cost, the maintenance expense, how much he will lose if he sells his horses, and whether or not the new motor service can be relied upon to deliver the goods without delay because of mechanical troubles on the road. All of this has required the commercial trade to work along different lines than did the pleasure car makers when they first put their wares on the market.

Comparisons of Shows

Harking back to December, 1907, when the National Association of Automobile Manufacturers segregated the two branches of the industry, showing the pleasure cars in the Coliseum and First Regiment armory, and the commercials in Tattersalls', one notices that in the first show twenty-one makers of commercial motor vehicles displayed thirty-three machines, whereas in the garden next week there will be on view more than seventy models representing thirty-two different makes. Of the Tattersalls' pioneers more than one-third now are out of business, but their places have been taken by others and the industry has kept abreast of the times, and ahead of it, if anything. In the old days the trade had all it could do to supply the demand for passenger vehicles, and consequently the commercial end of it suffered. If a purchaser desired a commercial vehicle, he could get it of course, but there was no strenuous skirmishing for orders as there now is.

This increase in the number of cars over that exhibited at previous A. L. A. M. shows, is due principally, it is believed, to the recent recruits to the licensed ranks, although many of those who were in last year's show are to be found in this. It is noted this year that the tendency seems to be for makers to quote prices on chassis alone, fitting bodies to suit the purchasers, for which an additional price is added. In the body line there are more light cars, such as delivery and public service machines, and buses, fire and hose wagons, and police patrols and ambulances. Because of the A. L. A. M. recruits showing so many of the light business wagons, the average load capacity this year is comparatively low, although some concerns have trucks which range as high as 10-ton capacity. The horsepower rating of the truck motors does not show a great increase, for the light cars, which are shown for the first time, brings this average rating down. The horsepower per ton load capacity averages from 2 horsepower per ton in the heaviest trucks to 57 horsepower per ton load in the light delivery cars. Of course, the latter cars show a higher rating on this basis, but their percent of net load capacity is much lower than in the heavier trucks.

Only One Six-Cylinder

So far as the A. L. A. M. is concerned, there is only one six-cylinder truck on the 1911 market, that being made by the Knox company. The four-cylinder engines have a big majority over the others, forty-five of the seventy-three models listed in Motor Age's tables being thus equipped. Next comes the twin with twenty-two, while the single-cylinder is in evidence with three models, one of which comes from the Brush, and the others from the Reo, which has just invaded the commercial field.

Two of the concerns pin their faith to three-cylinder motors of the two-cycle type. Taking the field as a whole, it is shown that the average horsepower of the commercial machines of the garden is 28.

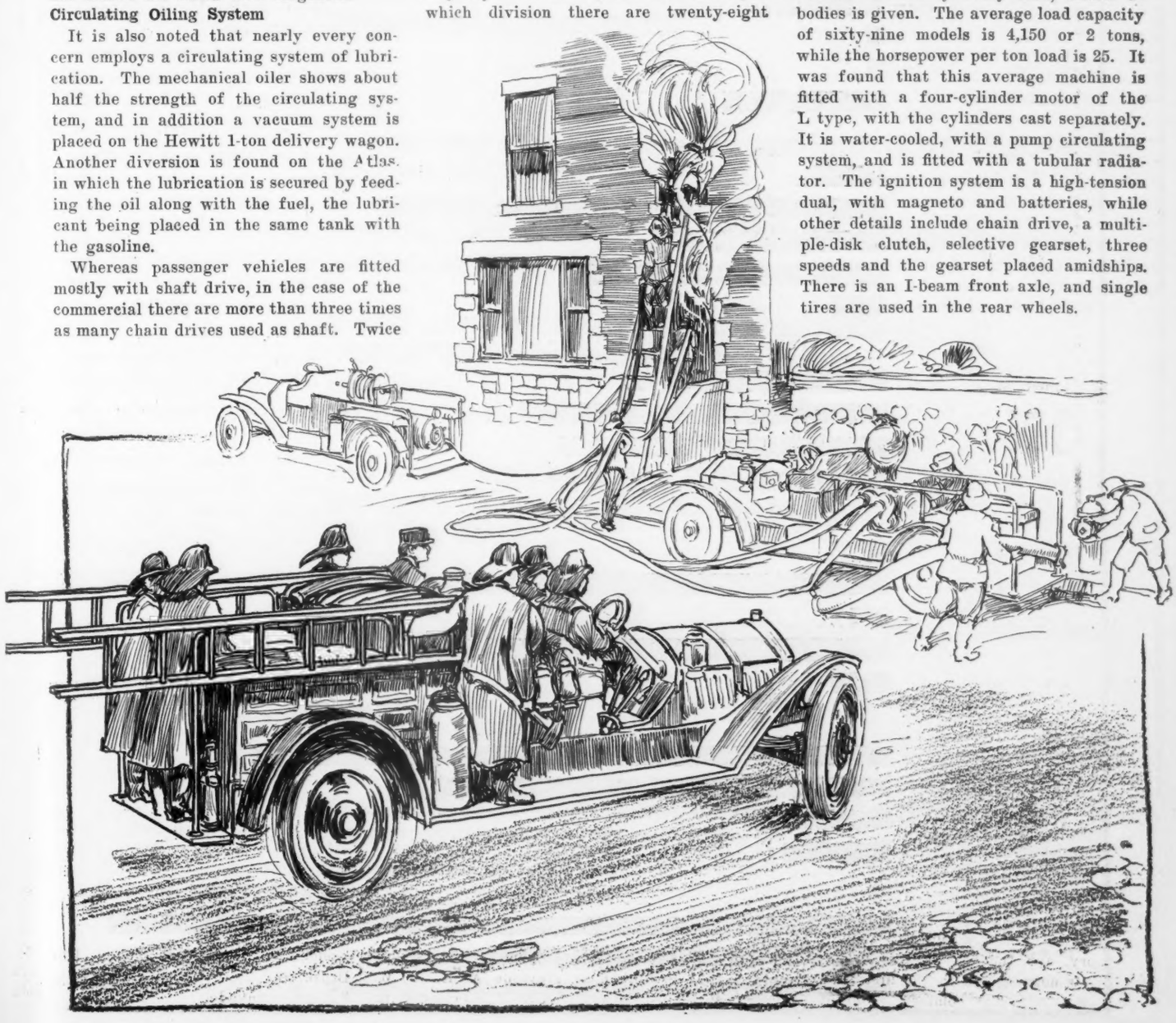
Moving on from the horsepower to the cylinders, it is discovered that nearly twice as many concerns cast them separately as do in pairs, and only eight cast them en bloc. This proportion of separately-cast cylinders is due to the air-coolers, the two-cylinder opposed type and the single cylinder. Sixty-five of the seventy-three use water-cooling and of the remaining eight the Franklin, McIntyre and Knox show air-cooled systems. About 70 per cent of those in the water-cooled division uses a pump for circulating the water, while the tubular type of radiator is just about as popular. With the exception of the Garford, which fits magnetic spark plugs, the ignition is high-tension, the dual having the preference and the single and double fighting for second place. Practically all of the trucks are fitted with magnetos.

Circulating Oiling System

It is also noted that nearly every concern employs a circulating system of lubrication. The mechanical oiler shows about half the strength of the circulating system, and in addition a vacuum system is placed on the Hewitt 1-ton delivery wagon. Another diversion is found on the Atlas, in which the lubrication is secured by feeding the oil along with the fuel, the lubricant being placed in the same tank with the gasoline.

Whereas passenger vehicles are fitted mostly with shaft drive, in the case of the commercial there are more than three times as many chain drives used as shaft. Twice as many multiple-disk clutches are used as cone, and in no place will band clutches be found. Mostly selective gearsets are fitted, while in the way of front axles the Brush delivery is the only one which uses a wooden front axle.

A glance at the statistical diagrams on the following pages is of interest in that they show the tendency according to the A. L. A. M. way of thinking. For instance, it is found that thirty-four of the seventy-three models have no set type of body, that being optional with the purchaser, in which event there is an extra charge, the list generally being quoted on the chassis only. Fifteen of the cars have delivery bodies, eleven of them are of the platform type, while nine are either buses or public service rigs. Six are fitted with express bodies. In the way of load capacity, twenty of them are under 1-ton, eleven are 1-ton propositions, eight are 2-ton, fourteen 3-ton, three 4-ton, six 5-ton, one 7-ton and one 10-ton. In the way of horsepower the majority is found between 15 and 25, in which division there are twenty-eight



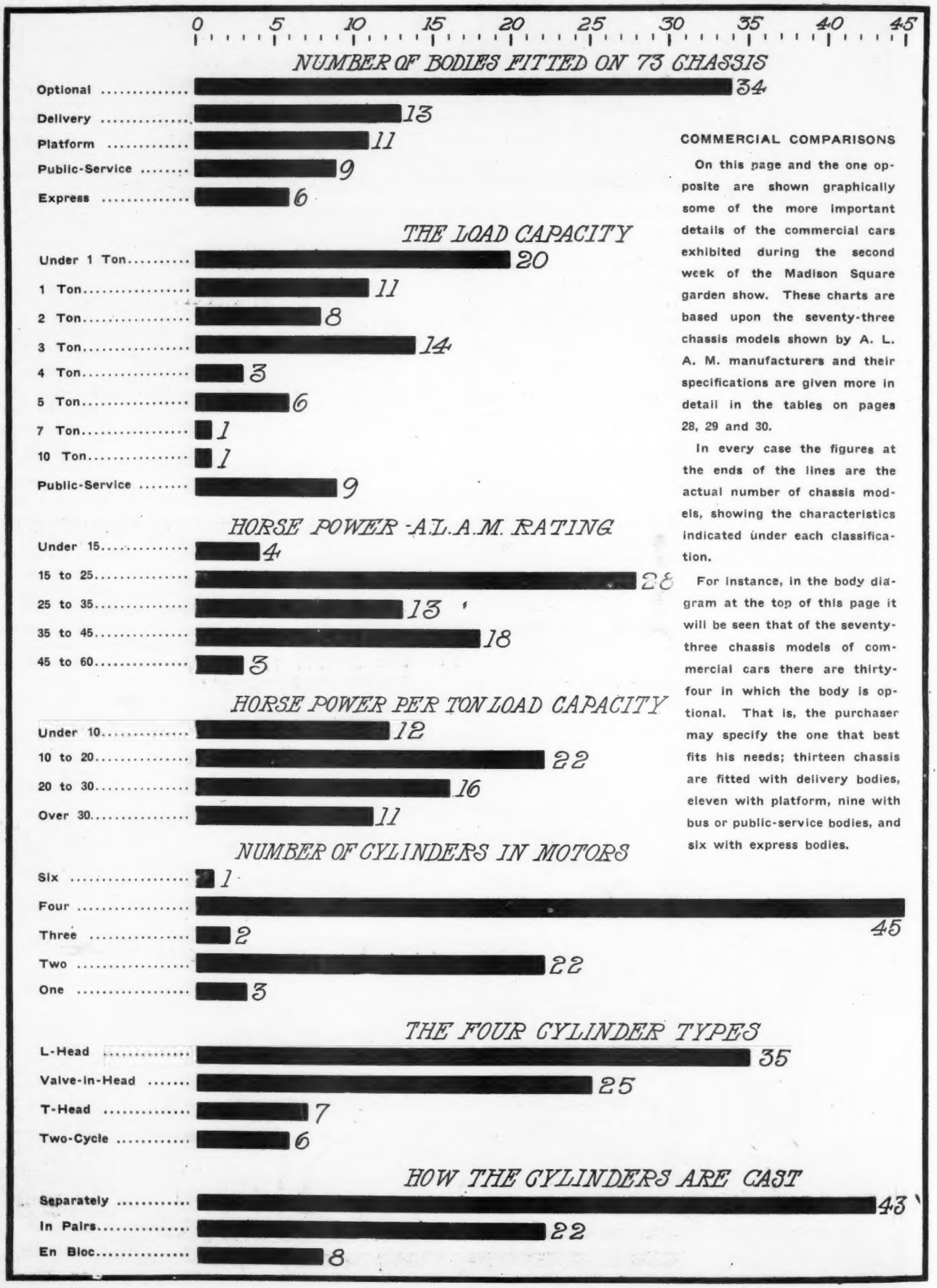
The dual type of tires for the rear wheels is popular on thirty-five models, but the single tire has a majority of three.

The Average A. L. A. M. Car

As evidenced by the cars that will be on view next week, the average A. L. A. M. commercial proposition is of 28 horsepower, and the average price is $2990. It might be explained in this connection that the average price of $2990 probably does not represent the exact figures, for some of the manufacturers quote figures on the chassis only, while some give no price at all. In reaching the $2990 average, fifty-six truck and delivery wagons were taken into consideration, and of these twenty-seven named prices on chassis only. Therefore, if all the figures could be secured, it undoubtedly would be found that the average list would be considerably higher.

Going into other details, it is found that the average wheelbase is 120 inches, with 35.4 inch rear wheels and 35-inch front wheels. In nearly every case, choice of bodies is given. The average load capacity of sixty-nine models is 4,150 or 2 tons, while the horsepower per ton load is 25. It was found that this average machine is fitted with a four-cylinder motor of the L type, with the cylinders cast separately. It is water-cooled, with a pump circulating system, and is fitted with a tubular radiator. The ignition system is a high-tension dual, with magneto and batteries, while other details include chain drive, a multiple-disk clutch, selective gearset, three speeds and the gearset placed amidships. There is an I-beam front axle, and single tires are used in the rear wheels.

Tendencies of the Licensed Commercial Cars for 1911



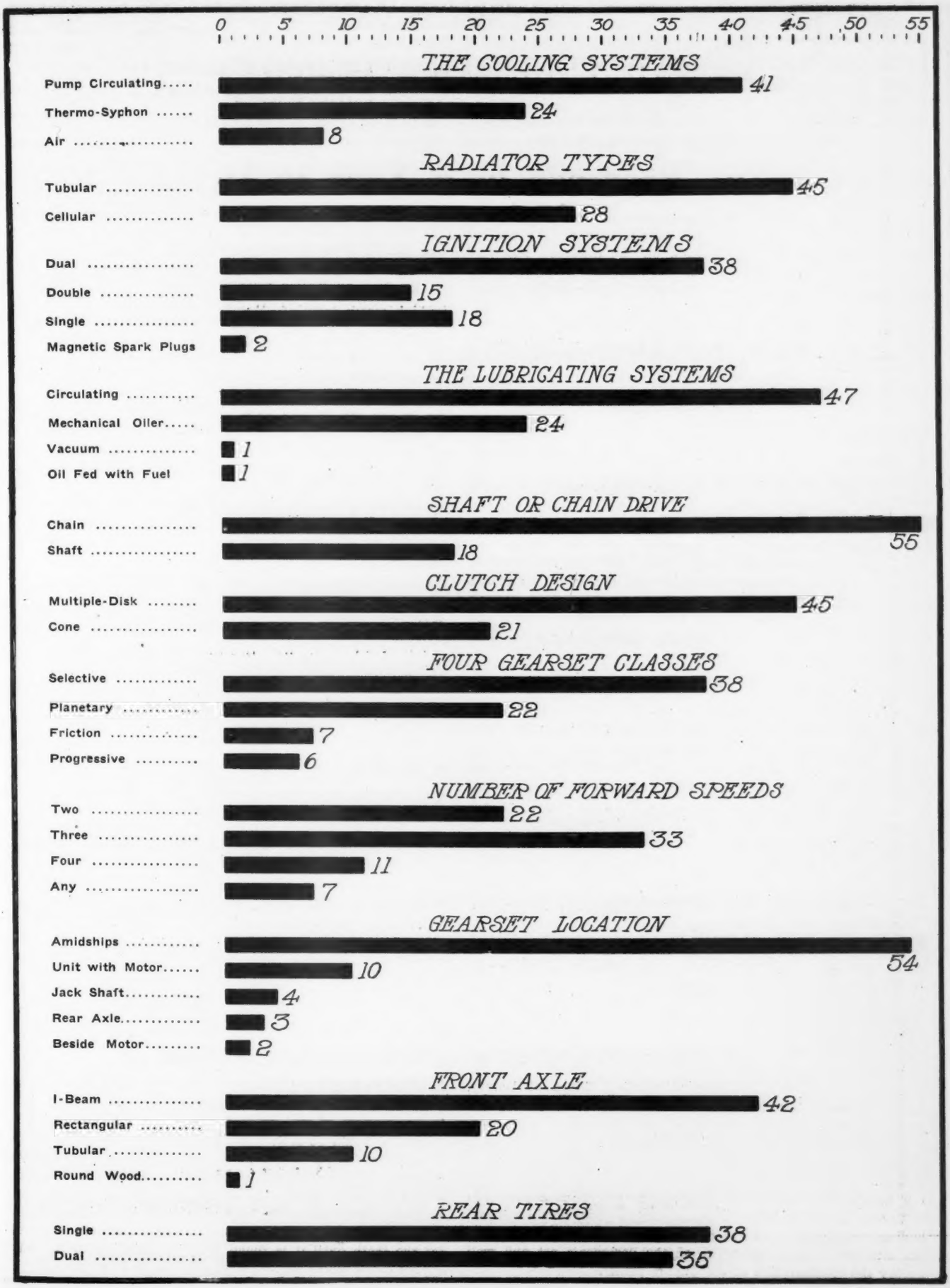
COMMERCIAL COMPARISONS

On this page and the one opposite are shown graphically some of the more important details of the commercial cars exhibited during the second week of the Madison Square garden show. These charts are based upon the seventy-three chassis models shown by A. L. A. M. manufacturers and their specifications are given more in detail in the tables on pages 28, 29 and 30.

In every case the figures at the ends of the lines are the actual number of chassis models, showing the characteristics indicated under each classification.

For instance, in the body diagram at the top of this page it will be seen that of the seventy-three chassis models of commercial cars there are thirty-four in which the body is optional. That is, the purchaser may specify the one that best fits his needs; thirteen chassis are fitted with delivery bodies, eleven with platform, nine with bus or public-service bodies, and six with express bodies.

Chart Showing the Status of Bodies and Chassis for 1911



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The Progress of a Year in Design

PROGRESS, meaning approaching the ultimate, can only be seen in its proper perspective from a distance. To call all the changes that have been made on the different cars this year would be far from recording the progress of the industry. There is a difference between alteration and progress. Alteration is frequently the adoption of a design because another concern has adopted it or because a certain hustling selling organization is selling it; on the other hand, progress means adopting something that takes its place in the evolution of the perfect creation, in this place the perfect car.

IF ALTERATION spelled progress the line indicating the progression would be a sinuous one and one impossible to follow. Scan a few of the alteration features of the last year or so: One concern 2 years ago used double ignition; a year ago it changed to dual; and this year it is back at double. Going back and then forward cannot be progress, when you go back as far one time as you progressed the next. Many concerns are doing this same thing. One year they use a fabric brake lining, the next metal is used and the following season some other material. The company makes no special effort to prove the special merits of each further than from hearsay and so the glib-tongued salesman is the big factor in the deal. This to-and-fro or pendulum action cannot be progress.

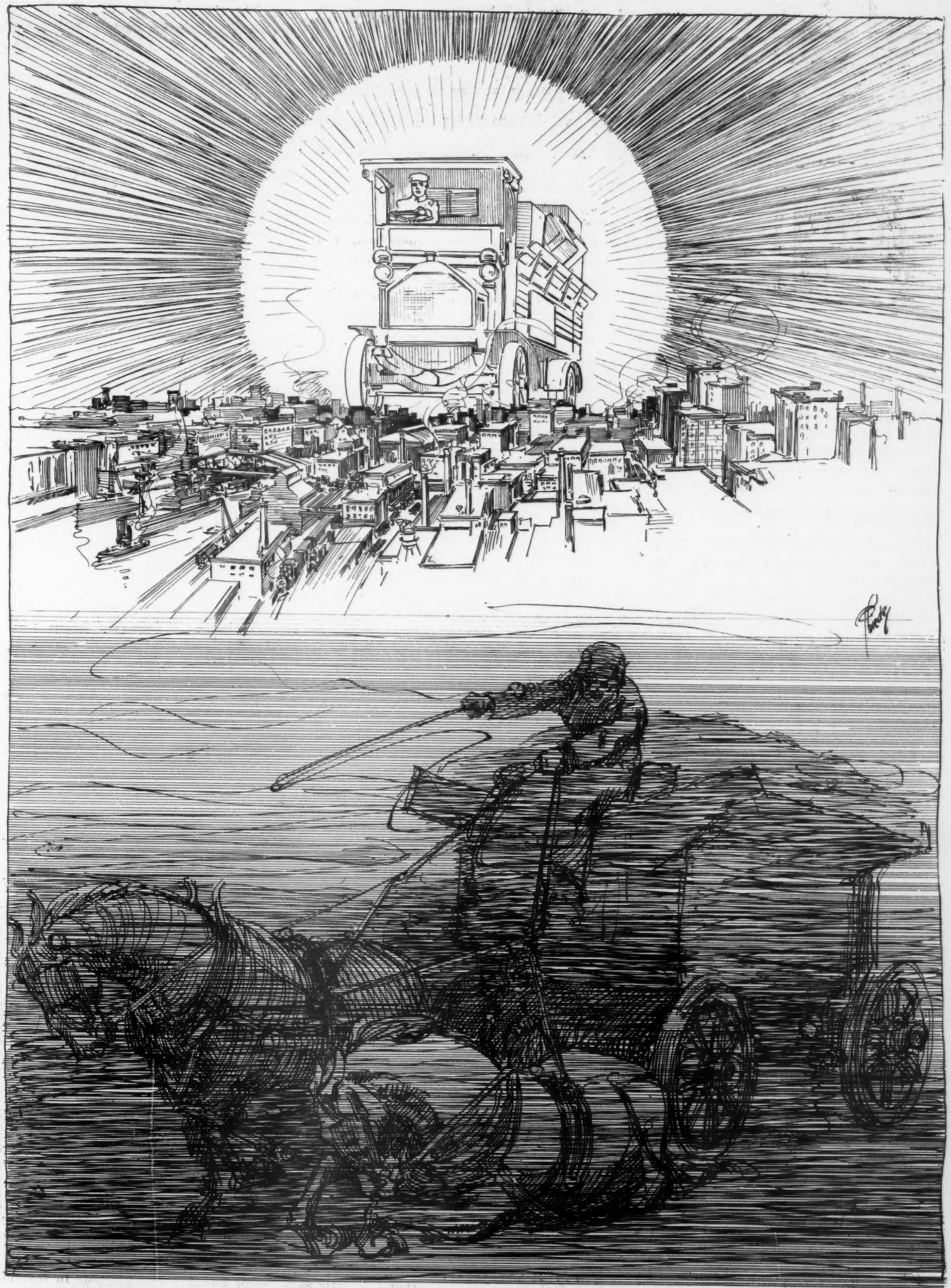
PROGRESS in car building as seen in a survey of the last 5 years might be styled the adoption of what lasts. The thermometer by which progress is measured is its permanency, its feasibility and its cost. Progress is invariably permanent; a self-starter which was in last year but is gone this year cannot be considered progress; a radiator type which had a run for 2 years but dropped out might be looked upon as an aid to progress in that it tells to the others what things can be left alone. Feasibility always has been a test of permanency. That which is the best thing that can be had must help to bring about the ultimate. Cost is frequently a factor in determining progress, because where it is prohibitive it will not advance. The device that cannot demonstrate its money's worth in open competition cannot continue.

NOBODY giving even a cursory glance at the cars exhibited in the garden show could help but see changes that can rightfully be called indications of progress. Simplicity is the ultimate in everything and it is coming very quickly in many parts of cars. Many chassis are becoming things of beauty, which a year ago were enough to make the buyer cross-eyed. The sharp angles have been rounded into healthy curves; the straggling masses have been lopped off; the excess weight has been cut down; strength has been added where science dictates it as necessary; the useless is gone; the whimsical cannot be found; the fads of an engineer are not so paramount as a year ago or 2 years, perhaps; the evidence of two or three semi-engineers having reproduced a car are rarely seen; and, in fact, many of the cars are excellent examples of the designer's art and well worthy the consideration of the buying public.

THE MANY recent improvements in cars are the result of experience that the engineer or some of the factory heads has had. The car is more and more becoming the work of one man's hands. Some years ago an engineer would take a motor design from an Italian machine; a gearset from a French factory; a clutch from an American shop; a German radiator; an English body; and putting them altogether call them his car. Could such be a creation of art and usefulness? The fair hair of the Anglo Saxon is not a good match for the swarthy skin of the Italian; and the corporation of the German is frequently a poor complement for the legs and arms of the Frenchman. So in the car, it was hard in the imitation days to produce a well-rounded out machine, one that gave real evidence of a sum total of progress. But those imitation days have ceased with many engineers and they are now busy with the retouching. It is just like the photographer; he makes his exposures and develops, but the picture is far from its finished stage. The dark shadows, the faint spots and the wrinkles have to be removed by the retoucher's art before the finished picture is ready for final inspection.

MORE REAL progress will be made next year than this year. Progress never travels the fastest when the demand exceeds the supply. With this halcyon condition, the maker just builds cars. What is the use of refining, because there is more money in building and selling than in refining and not manufacturing very fast. During the last few months several of the engineers have had some spare time; some of the makers have found that they have cars to sell; and the engineers have awakened to the fact that perhaps there is something wrong with their cars, because other machines are being sold and other factories are busy. This sets them studying, thinking and perhaps designing.

OUR ENGINEERS have not studied enough in the past; a few of them have, the majority have not. So many have been copyists that study never entered their minds. They built a motor after some foreign design and were content to follow its alteration menu from year to year, the engineer making his annual European visit to discover just what he should do for the following year. But these conditions are passing. Many of the factories have good testing laboratories, some have the best chemists to analyze materials best suited for different cars. In this way intelligent work is being done. It is foolish to use a manganese bronze part instead of a forging simply because some Swiss concern does it; it is equally foolish to use a pressed steel part where a forging would be better because an Englishman has done it. The engineer should study his part and build to meet its conditions. When he does that he is in quest of real progress. Sometimes he may turn right when he should go left, but he will eventually get there if he remains true to the fixed laws of science. It is not a healthy sign when something different is used solely because it is different; but it is a very healthy indication when something new is used, because, according to the laws of science, it is right, no matter whether the critic says yes or no. Progress consists in searching for the truth until it is found and then sticking to it, and this applies to the motor car industry.



THE DAWN OF A NEW DAY

All Kinds of Bodies For Commercial Use

Purchasers Can Be Accomodated in Everything From Light Cars for Delivery Purposes Up To Mammoth Trucks for Heavy Haulage Purposes by All Sorts of Business Concerns

THE intending purchaser of business vehicles will find the show offers a wide range of choice in bodies. Among the seventy-three models exhibited can be found the light cars for rapid delivery of small packages, the more powerful motor-driven express wagons for heavier loads, and the mammoth trucks which transport 10 tons of freight at a load. Those interested in public-service cars will find represented buses for passenger traffic, motor fire engines, hose and chemical wagons, patrols and ambulances.

Some Quote only Chassis Prices

Most of the exhibitors present several bodies on the same chassis, quoting a standard price on this part of the car alone, and allowing the purchaser to select the type and, within certain limits, the size of body desired. Among those pursuing this policy are the makers of such vehicles as the Hewitt, the two-cycle Reliance, the Knox, Garford, Sampson, and White. Other manufacturers exhibit a certain type of body as their regular line.

As might be expected, the size of the load platform shows a great variance among the different cars, running from 4¼ by 3 feet in the single-cylinder Brush delivery car, to 18 by 7½ feet in the big Hewitt 7-ton trucks. The average load platform of the commercial cars exhibited is about 10 by 5 feet, and is exemplified in the Knox 2-ton cars. The total length of cars for business purposes has some bearing upon their availability for certain uses, as storage and garage facilities are often limited. The cars with the greater tonnage capacity necessarily take up the most room, the Hewitt 10-ton truck being the leader in this respect. At the other end of the scale are the Randolph 2-ton truck with its length of 9 feet, and the Reo light cars with the same length.

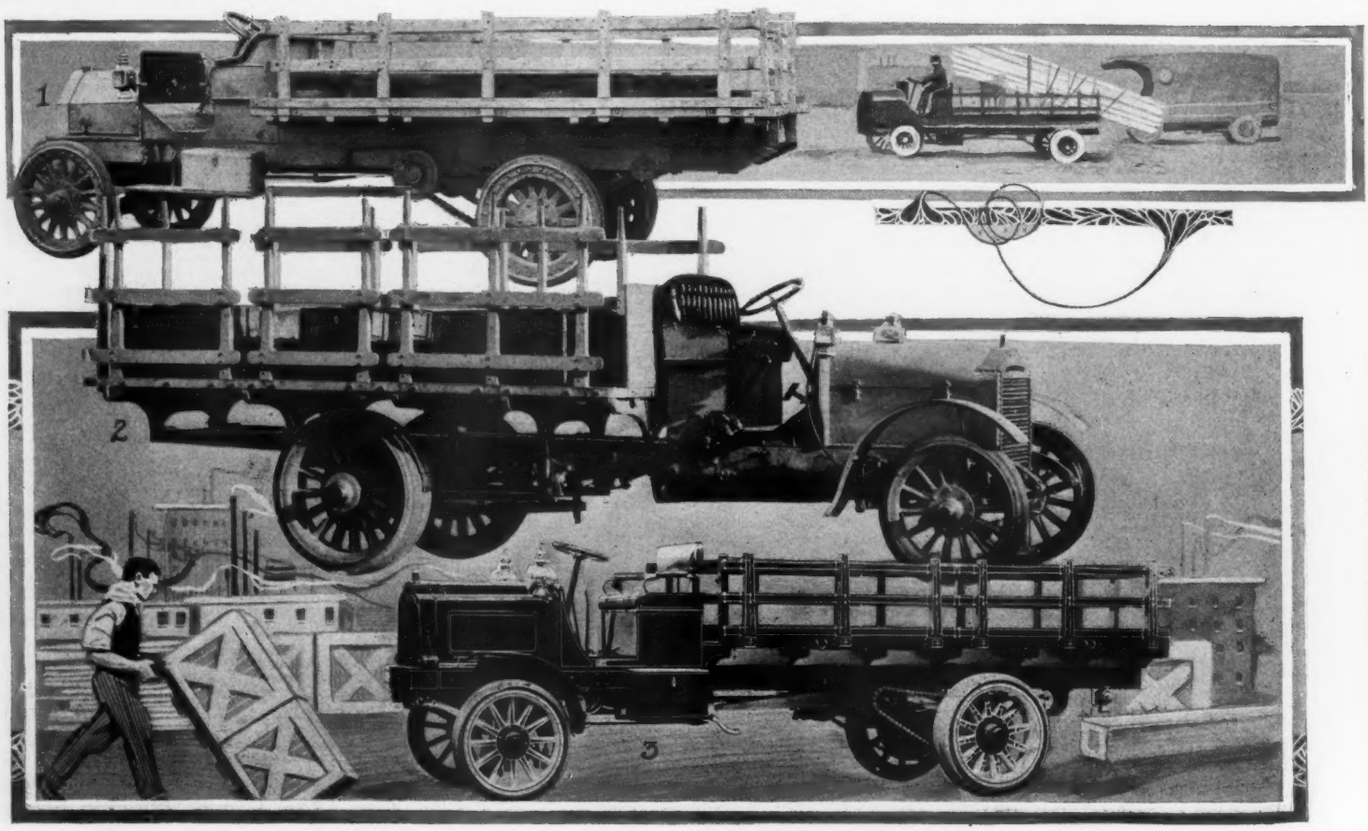
Placing Load Well Back

The tendency to place the load well back toward the rear wheels is quite noticeable, especially in such cars as the Mack 1-ton truck, in the Packard and the White 3-ton trucks, and the commercial Kisselkars. In these instances the load is very nearly balanced over the rear wheels, which are often dual to stand the higher percentage of loading. In the greater proportion of the commercial cars the load platform extends from one-fourth to one-third of its length beyond the rear wheels, as shown in the Alco and Garford trucks, illustrated on page 24. In some of the light cars no attempt has been made to place the balance of the load toward the rear, for in these cars the conditions are more nearly those obtaining in the pleasure car field. In general, however, makers of the heavier motor cars believe steering is easier with the front wheels carrying most of the motor load and the greater portion of the traffic load toward the rear.

Many Delivery Cars

The delivery cars are very well represented, and as the requirements for them

Some of the A. L. A. M. Commercial Cars for New Year



Three of the Heavier Commercial Cars

1—The Stearns 3 to 5-Ton Truck; 2—Pierce 5-Ton Truck Uses Worm Drive; 3—Packard 3-Ton Stake Body

Many Makers Quote Prices on Chassis Only

Custom Seems to Be to Let the Purchaser Choose the Body He Desires—Average Load Platform of Cars on View is About 10 by 15 Feet—Special Ideas Are Carried Out

are nearly the same as for pleasure vehicles, we find most of them are made by firms whose principal output is pleasure cars. The special commercial body is usually fitted to the standard pleasure chassis, the Grabowsky screen delivery car being perhaps the only exception. Among delivery cars shown by pleasure-car manufacturers are the Jackson, the Atlas, closed-panel car, the Brush and Buick enclosed bodies, the Cartercar in both panel and open bodies, the canvas-side McIntyre, and the Stoddard, with its panel body. The Overland delivery car is shown in both the open and enclosed types.

Express bodies range in load capacity from the 600-pound Reo to the 3-ton Alco. The Buick ½-ton car appears as either express, platform or delivery. The friction-drive Cartercar is shown as a 1,500-pound express wagon, and the air-cooled Franklin in a 1-ton express car is shown, while the McIntyre shows two cars of this type on different chassis with a load capacity of 1,200 pounds each. The White company exhibits 1,500-pound gasoline car with express body, while the Mack 1-ton truck appears among the express cars, some of which are shown on page 23. Most of the platform bodies are arranged to be converted into stake bodies, and are presented by the Buick, Cartercar, Franklin, Grabowsky, Kisselkar, the friction-drive Lambert, and the Peerless in two sizes, 4-ton and 3-ton. The Stearns and White also show platform bodies, the former a 5-ton body and the latter a 3-ton body. Five cars with platform or stake bodies are shown on page 25.

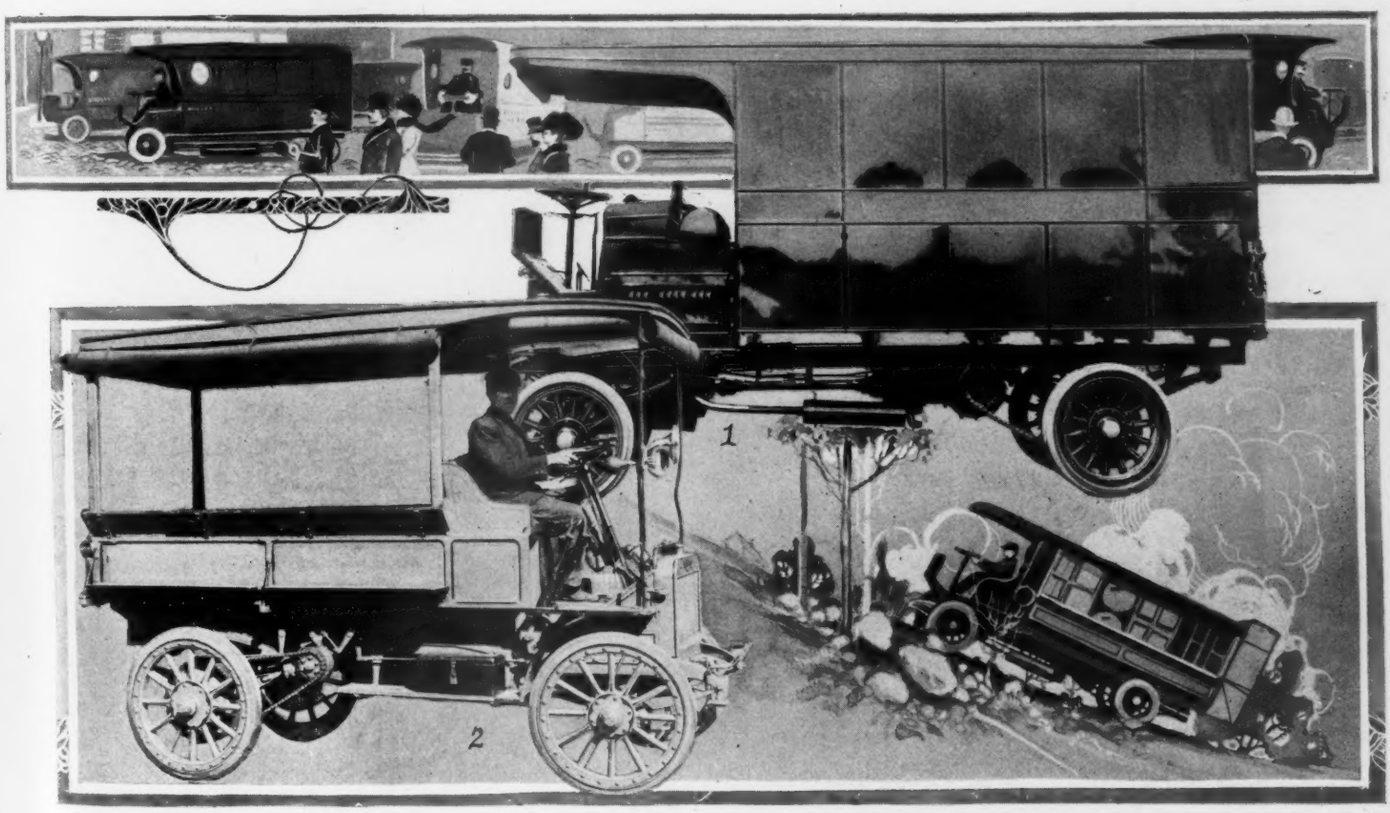
Some Fire-Fighters

The commercial passenger-carrying cars are represented by a ten-passenger Franklin bus, and the public service vehicles appear in several different types. For fire-fighting purposes there are the Knox hose wagons, chemical cars, and fire engines and the Pope-Hartford fire wagon. A special car for the use of fire chiefs is made in the Autocar factory and is illustrated with other fire appliances on page 26. The police patrols are seen in the Franklin, Knox, Thomas, Packard, and Pope-Hartford lines, with ambulances for police and hospital service and shown on page 27.

Some special bodies do not come under any of the above body types. Such is the Hewitt 3-ton coal truck. This is fitted with a special dumping arrangement for unloading. Another special body is the Knox emergency tower and wrecking car, not shown, for street railway service.

Some of the trucks are fitted with a power-driven winch, which may be brought into play for hoisting the load. This does away with extra handling as the freight may be elevated directly from the truck to the second or third floors. A car equipped for this purpose is the Knox 3-ton truck, illustrated on page 25. Another commercial car equipped with a special loading body is the Packard special lumber wagon, illustrated on the same page. It is fitted with arrangements for stacking the lumber.

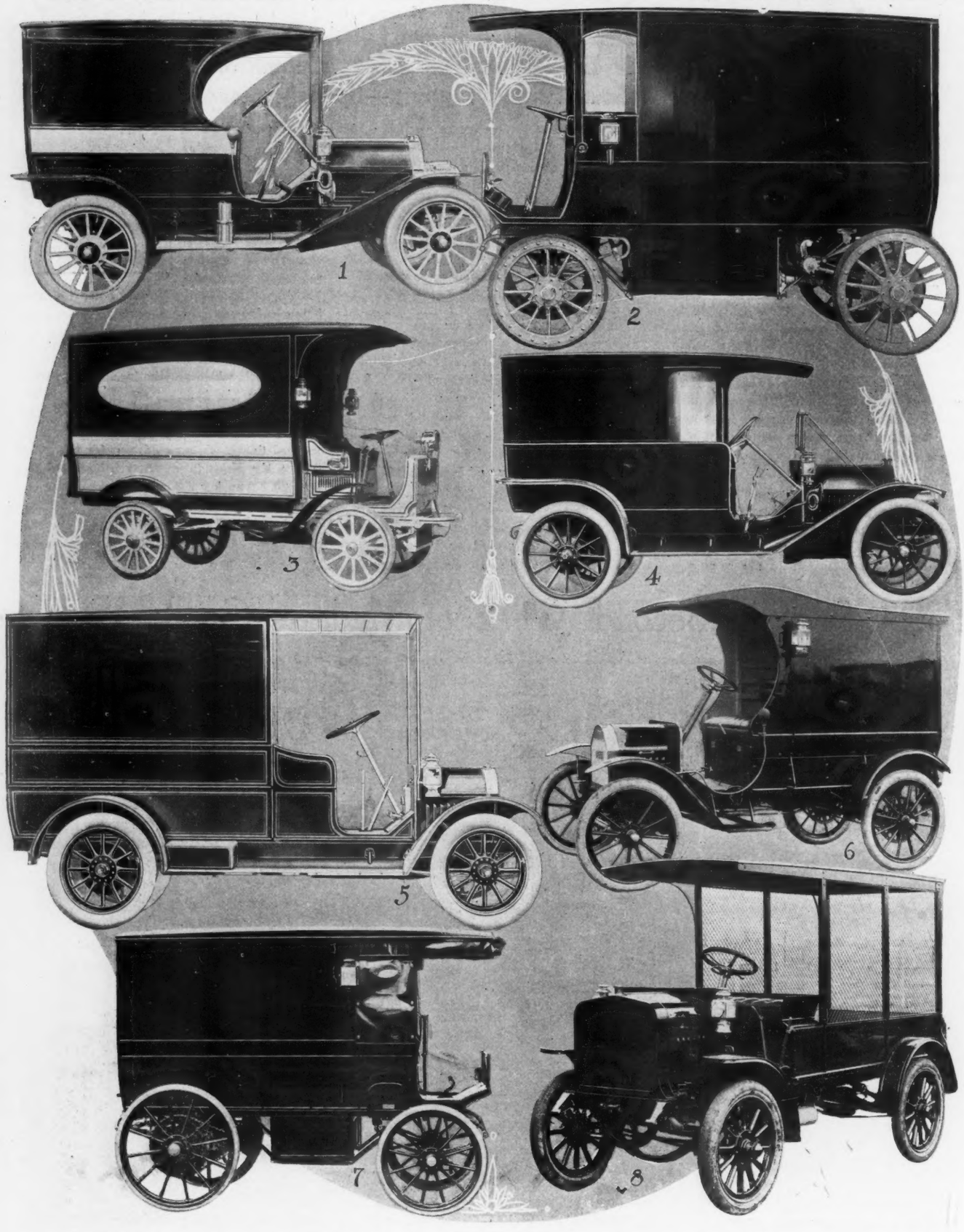
To be Seen in Second Week of Madison Garden Show



Some Enclosed Bodies in the Business Realm

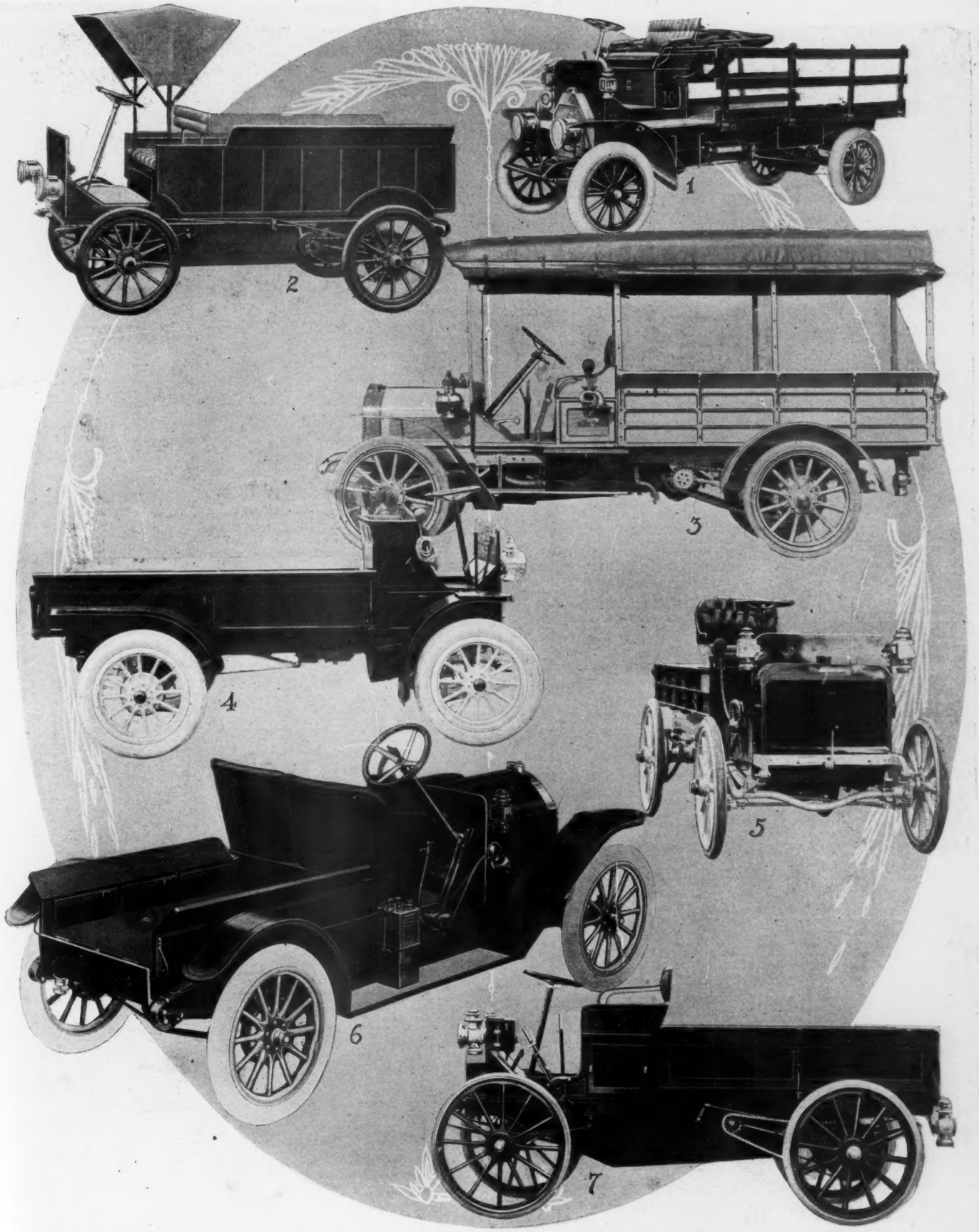
1—The Knox as a Panel Body; 2—The Randolph 2-Ton Canvas-Side Express

Light Cars Will Be Very Much in Evidence This Year



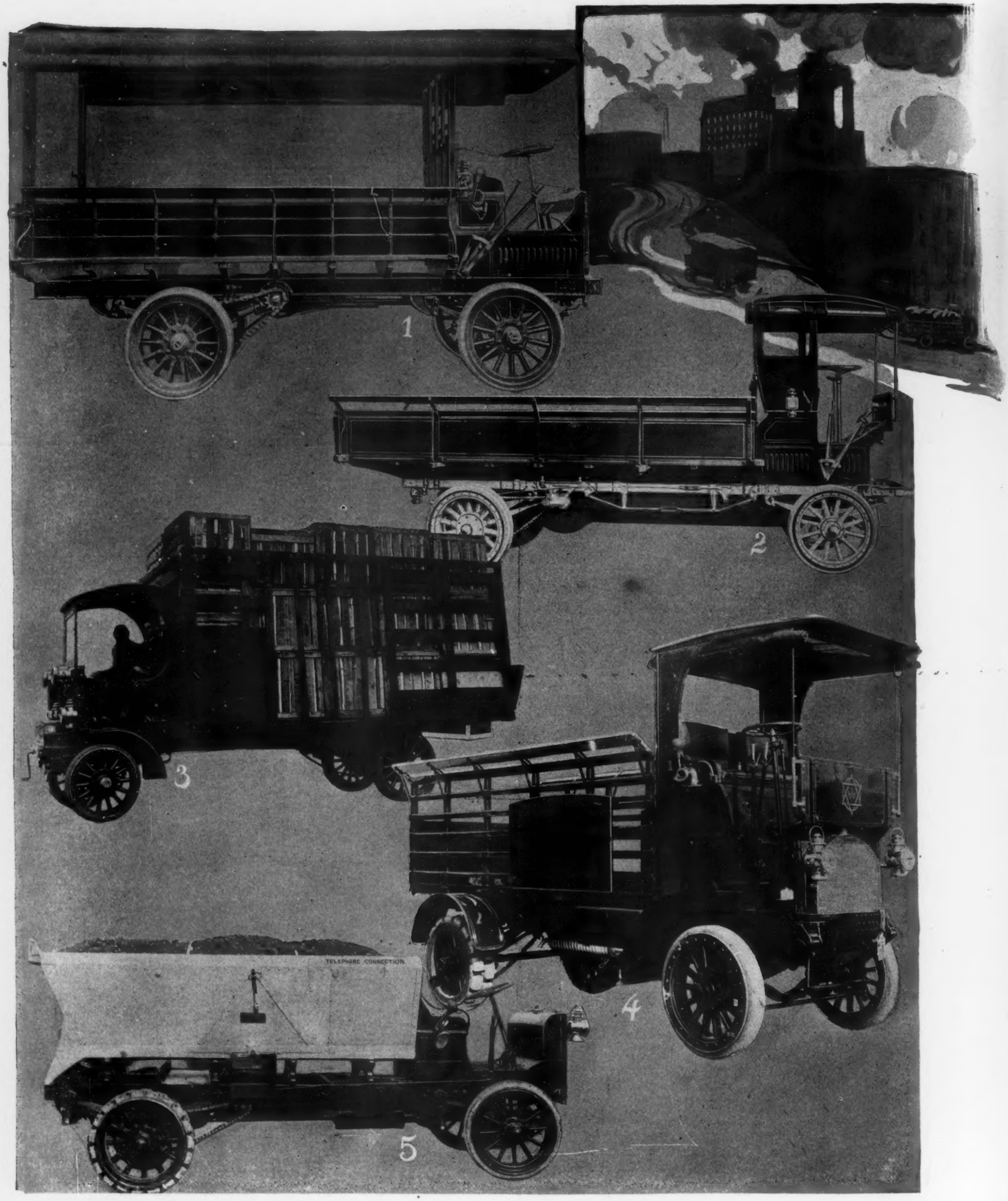
1—Overland as an Enclosed Delivery Car; 2—Waverly Electric Delivery Wagon; 3—Autocar Enclosed Type; 4—Everitt 30 as a 1,000-Pound Delivery Car; 5—A Two-Cycle Delivery Car from the Atlas Factory; 6—The Single-Cylinder Brush Delivery; 7—Studebaker Electric; 8—Sampson Light Truck with a Screen Body

A. L. A. M. Offerings in Light Business Power Wagons



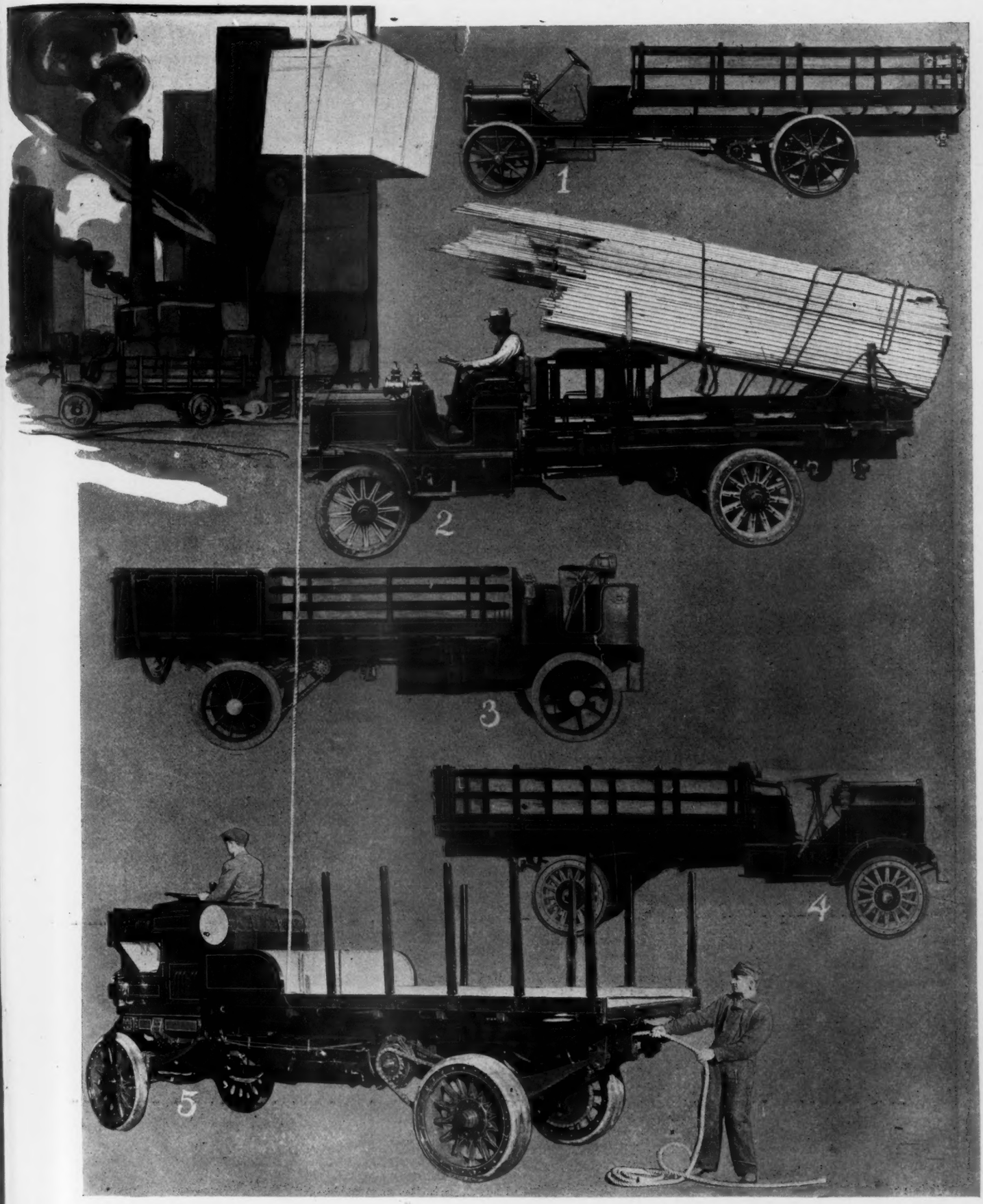
1—The Overland in a Stake Body; 2—Anderson Company's Detroit Electric; 3—Mack 1-Ton Express Truck; 4—Franklin 1-Ton car with Open Body; 5—Cartercar for Commercial Service; 6—Stoddard for Delivery Purposes; 7—The Reo Delivery Car, which is one of the newcomers on the market

Giant Motor Trucks Designed for All Lines of Industry



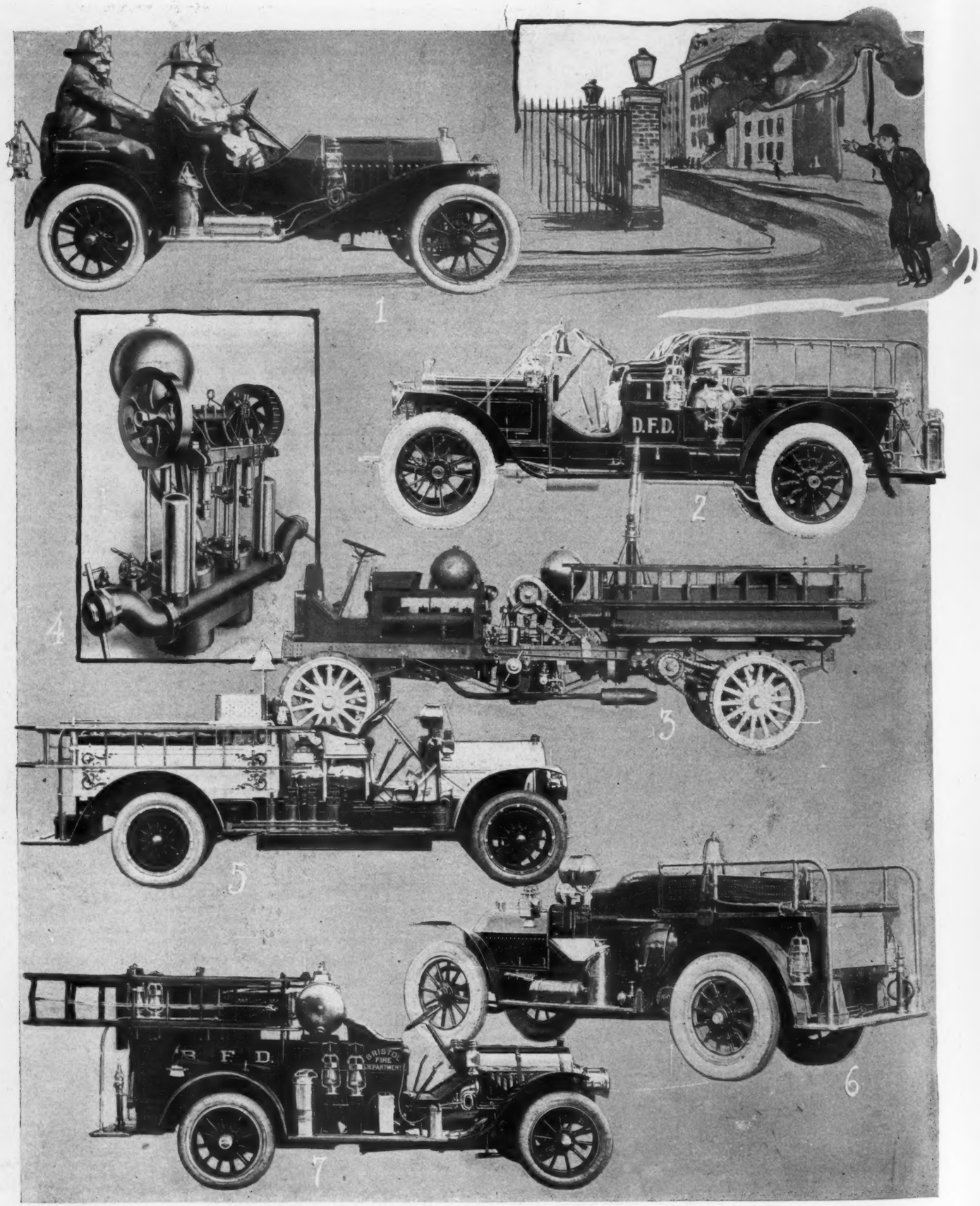
1—The Alco 3-Ton Canvas-Side Express; 2—Garford 3-Ton with Special Heavy-Service Body; 3—The Grabowsky Under Load; 4—Mack 5-Ton Truck; 5—Hewitt 3-Ton Dump-Wagon for Coal

Offered at the Madison Square Garden Show in New York



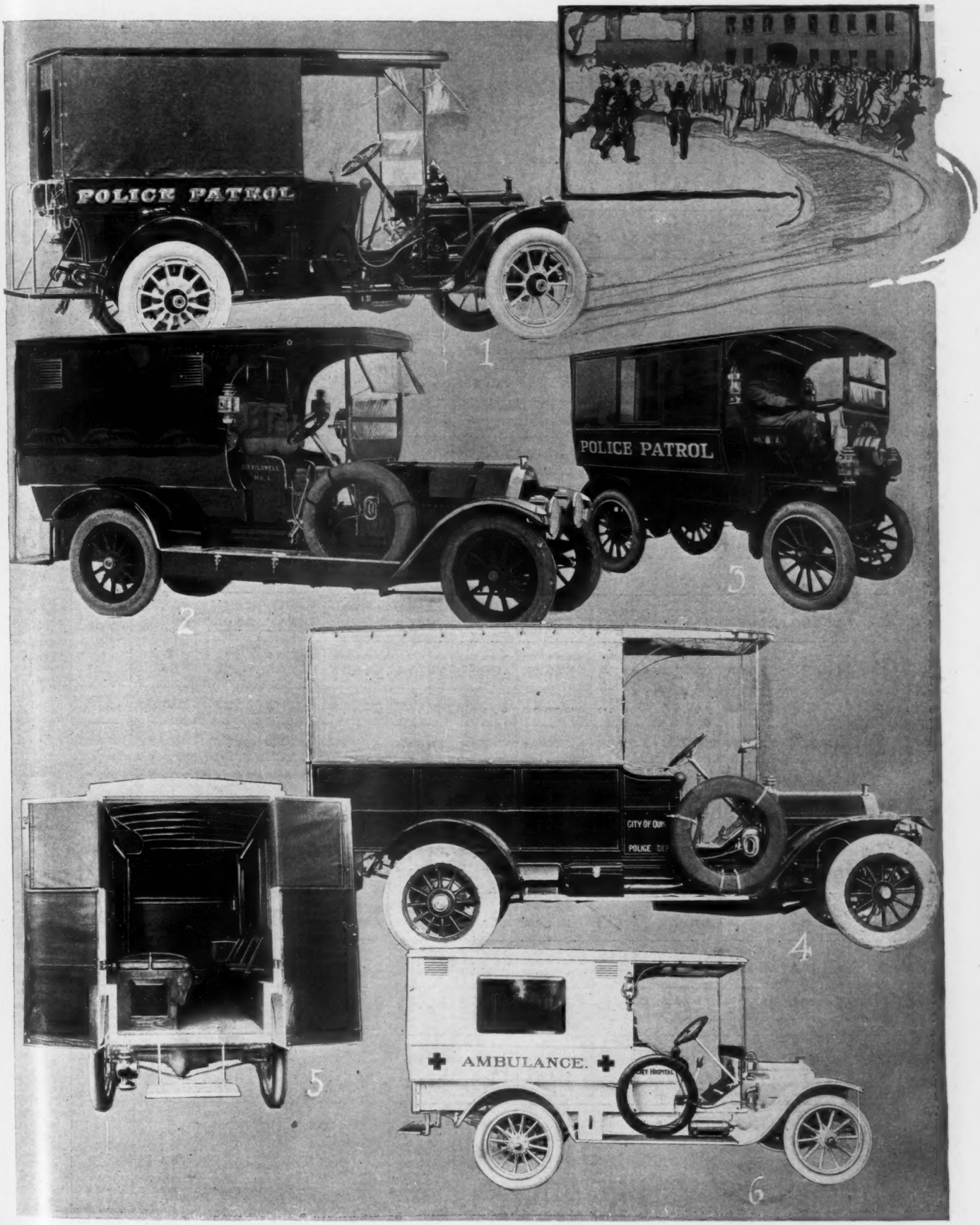
1—White 3-Ton Truck with a Stake Body; 2—The Packard Special Lumber Wagon; 3—Morgan 5-Ton Truck with Unique Driver's Compartment; 4—The Kisselkar Has Enclosed Side Chains; 5—Knox 3-Ton Truck Equipped with Power-Driven Winch

Cars for Fire-Fighting are Shown in Madison Square Garden



1—Autocar for Fire Chiefs; 2—Packard 30 Chemical Car; 3—Knox 60-Horsepower Fire Engine; 4—Fire Pump on the Knox; 5—Knox Chemical Combination Fire Wagon; 6—Locomobile Chemical Truck; 7—The Pope-Hartford Offering to the Firemen

Motor Police Patrols and Ambulances for Municipal Service



1—Packard 30 Police Patrol; 2—Thomas Six-Cylinder Patrol Wagon; 3—Franklin Air-Cooled Patrol; 4—Knox Patrol with Side Curtains; 5—Interior of the White Ambulance; 6—White Ambulance for Hospital Use

Motor Specifications of Commercial Cars Manufactured by Members of A. L. A. M. for 1911 Season

Table No.	NAME	BODY	Load, Lbs.	Price	Chassis Model	Load Platform in Feet	Total Len'th in Ft.	No. Cyl.	Bore	Stroke	H. P. A.L.A.M.	Cyl. Vol.	Cyl. Type	Cyl., How Cast	Loc. of Valves	COOLING			IGNITION					CARBURETER		Motor Lubrication
																Type	Circulation	Radiator	Type	System	Magneto	Current Source	Control	Design	Gasoline Feed	
1	Alco	Express	6,000	$3,650	5-3 Ex.	12 x5½	16½	4	3⅛	4½	24.7	231.3	T	Pairs	L. Side	W	P	C	H-T.	Sing	Bosch	Mag	Fixed	Stromberg	G	C
2	Atlas	Delivery	1,500	2,000	L	6 x4	10	2	4½	4½	18.0	143.2	*	"	....	"	"	T	"	Dual	A.-K.	AK&C	Hand	Own	"	G
3	Autocar	Optional	3,000	2,150	XXI-B	.....	...	2	4½	4½	18.0	159.5	L	Sep.	Side	"	"	"	"	Sing	Bosch	Mag	Fixed	Stromberg	"	M
4	Brush	Delivery	600	685	M	4½x3	10	1	4	5	6.4	62.8	"	Bloc.	"	"	T	C	"	Dual	"	M & C	Hand	Kingston	"	C
5	Buick	Exp. or Plat	1,000	1,000	2-A	6½x3½	11½	2	4½	5	16.2	159.1	H	Sep.	Head	"	P	T	"	"	Remy	"	"	Schebler	"	"
6	Buick	Delivery	1,000	1,200	2-A	6½x3½	11½	2	4½	5	16.2	159.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
7	Cartercar	Platform	1,500	1,250	T	6½x3½	12	2	4½	4½	16.2	143.2	L	"	Side	"	T	"	"	"	Splitd'f	M & B	"	"	"	M
8	Cartercar	Express	1,500	1,300	T	6½x3½	12	2	4½	4½	16.2	143.2	"	"	"	"	"	"	"	"	"	"	"	"	"	"
9	Cartercar	Delivery	1,500	1,250	T	6½x3½	12	2	4½	4½	16.2	143.2	"	"	"	"	"	"	"	"	"	"	"	"	"	"
10	Franklin	Express	2,000	....	L-5	8 x3¾	10¾	4	3⅜	4	18.3	143.1	H	"	"	A	..	....	"	Sing	Bosch	Mag	Fixed	Own	"	"
11	Franklin	Stake	2,000	....	L-5	8 x5½	10¾	4	3⅜	4	18.3	143.1	"	"	"	"	..	....	"	"	"	"	"	"	"	"
12	Franklin	Patrol	10 pass	....	L-5	.....	11	4	3⅜	4	18.3	143.1	"	"	"	"	..	....	"	"	"	"	"	"	"	"
13	Franklin	Bus	10 pass	....	L-5	.....	11	4	3⅜	4	18.3	143.1	"	"	"	"	..	....	"	"	"	"	"	"	"	"
14	Garford	Optional	2,000	2,250	1-Ton	Opt.	Opt	4	4	3½	25.6	143 1	L	Pairs	L. Side	W	P	T	"	Dual	Splitd'f	M & B	Hand	Mayer	"	C
15	Garford	"	4,000	...	2-Ton	"	"	4	4½	5½	36.1	389.9	T	"	Opp.	"	"	"	M-P.	"	Bosch	"	"	Own	"	M
16	Garford	"	6,000	....	3-Ton	"	"	4	4½	5½	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
17	Glide	Delivery	....	2,000	Tour.	.....	..	4	4½	5	36.1	354.4	L	Sep.	Side	"	"	C	H-T	Doub.	Opt.	M & B	"	Schebler	"	C
18	Grabowsky	"	2,000	2,307	....	8 x4	13½	2	5½	5	24.2	237.6	T	"	Opp.	"	T	"	Dual	Dual	Hercu's	"	"	Breeze	"	M
19	Grabowsky	Stake	3,000	2,650	....	11x5½	17	2	5½	5	24.2	237.6	L	"	Side	"	"	"	"	"	"	"	"	"	"	"
20	Grabowsky	"	4,000	3,050	....	11 x5½	17	2	5½	5	24.2	237.6	"	"	"	"	"	"	"	"	"	"	"	"	"	"
21	Grabowsky	"	6,000	3,500	....	12 x6	17	2	6	5	28.8	282.7	"	"	"	"	"	"	"	"	"	"	"	"	"	"
22	Hewitt	Optional	20,000	6,000	10-Ton	18x7½	23	4	4½	6	28.9	340.4	"	Pairs	L. Side	"	P	"	"	Sing	Bosch	Mag	Fixed	Own	"	C
23	Hewitt	"	14,000	5,500	7-Ton	15x7	20	4	4½	6	28.9	340.4	"	"	"	"	"	"	"	"	"	"	"	"	"	"
24	Hewitt	"	10,000	5,000	5-Ton	14x6½	19	4	4½	6	28 9	340.4	"	"	"	"	"	"	"	"	"	"	"	"	"	"
25	Hewitt	"	6,000	3 000	3-Ton	13x6	16	2	5½	5	24.2	237.6	"	Sep.	Side	"	T	"	"	"	"	"	"	Schebler	"	"
26	Hewitt	"	4,000	2,750	2-Ton	12x6	16	2	5½	5	24.2	237.6	"	"	"	"	"	"	"	"	"	"	"	"	"	"
27	Hewitt	Delivery.	....	2,000	1-Ton	7½x4	12½	4	3½	4½	16.9	149.3	"	Bloc	L. Side	"	P	"	"	"	"	"	"	Own	"	"
28	Jackson	"	1,000	850	20	5½x3½	11½	2	5½	4	22.0	173.2	"	"	Side	"	T	"	"	Dual	....	M & C	Hand	Schebler	"	M
29	Jackson	"	1,000	1,000	C	6½x3½	12	2	5½	5	22.0	216.5	H	"	Head	"	"	"	"	"	....	B & C	"	"	"	"
30	Kisselkar	Stake	6,000	3,500	A	12¼ x6	19¼	4	4½	4½	38.0	354.6	L	Pairs	L. Side	"	P	T	"	"	Bosch	M&A-K	"	Stromberg	"	C
31	Knox	Patrol.	2,000	3,000	64	7½x3½	15	4	5	4½	40.0	373.0	H	Sep.	Head	"	"	"	"	Doub.	"	M & C	"	"	"	"
32	Knox	Hose	4,000	5,500	M-4	7x 3½	15	4	5½	5½	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"	"	"	"
33	Knox	Chemical	4,000	5,400	M-3	8½x5½	17	4	5½	5½	48.4	522.7	"	"	"	"	"	"	"	"	"	"	"	"	"	"
34	Knox	Fire Engine	....	8,500	8	.....	20	6	5	4½	60.0	559.5	"	Pairs	"	"	"	"	"	"	"	M.A-K.C	Gov.	Scott	"	"
35	Knox	Optional.	4,000	3,250	R-5	10 x5	14	4	5	4½	40.0	373.0	"	Sep.	"	"	"	"	"	"	"	M & C	Hand	Stromberg	"	"
36	Knox	"	4,000	3,400	R-7	12 x5	16	4	5	4½	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
37	Knox	"	4,000	3,650	R-14	10 x5	16	4	5	4½	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
38	Knox	"	6,000	2,850	R-15	12 x6	18	4	5	4½	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
39	Knox	"	8,000	4,000	R-16	14 x6	20	4	5	4½	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
40	Knox	"	10,000	4,200	R-17	14½x6	21	4	5	4½	40.0	373.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
41	Knox	"	4,000	3,500	G-14	10 x5	16	4	4¼	5½	36.1	389.9	"	"	"	A	..	....	"	"	"	"	"	"	"	"
42	Lambert	Stake	6,000	3,500	....	10 x6	16	4	5	6½	40.0	510.5	L	Pairs	Side	W	P	T	"	Dual	Kurtz	"	Gov.	"	"	"
43	McIntyre	Delivery	600	550	519	2⅝x2⅝	9½	2	4½	3¾	13.6	100.3	H	Sep.	Head	A	..	....	"	Sing	....	Dry C.	Hand	.....	"	M
44	McIntyre	"	1,200	850	211	6½x3½	10	2	4½	4½	18.0	168.4	"	"	"	"	..	....	"	Dual	Opt.	M & C	"	Breeze	"	C
45	McIntyre	Express.	1,200	800	251	5½x3½	10	2	4½	4½	18.0	168.4	"	"	"	"	"	....	"	"	"	"	"	"	"	"
46	McIntyre	"	1,200	1 000	VII	5½x3½	10	2	4¼	4½	18.0	168.4	L	"	L. Side	W	T	T	"	"	"	"	"	"	"	"
47	Morgan	Optional	10,000	4,750	B	13½x6	17½	4	5	5	40	392.7	H	Bloc	Head	"	P	C	"	Doub.	U. & H.	M. & B.	"	Own	"	"
48	Overland	Delivery	800	1,000	37	4 x5½	12	4	3¾	4½	22.5	198.8	L	Sep.	L. Side	"	T	T	"	Dual	Remy	M & C	"	Schebler	"	"
49	Packard	Optional	6,000	3,400	3-Ton	12 x4	19½	4	4½	5½	32.4	343 9	T	Pairs	Opp.	"	P	C	"	"	Eisem'n	M. & B.	Fixed	Own	"	"
50	Peerless	Platform	8,000	....	4-Ton	12 x6	19½	4	4½	6½	32.4	413.5	"	"	"	"	"	T	"	"	....	"	Hand	"	"	"
51	Peerless	Stake	6,000	....	3-Ton	12 x6	19½	4	4½	6½	32.4	413.5	"	"	"	"	"	"	"	"	....	"	"	"	"	"
52	Pope-Hartford	Fire Wagon	....	5,000	W	.....	...	4	4¾	5½	36.1	389.9	H	"	Head	"	"	"	"	"	Bosch	Mag	"	"	"	"
53	Pope-Hartford	Patrol	...	4,500	W	.....	...	4	4¾	5½	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
54	Pope-Hartford	Ambulance	....	5,000	W	.....	...	4	4¾	5½	36.1	389.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
55	Randolph	Optional	2,000	1,850	C-2	9 x4	9	2	5½	4½	22.0	205.7	L	Sep.	Side	"	T	C	"	Opt.	Opt.	M. & C.	"	Schebler	"	"
56	Reliance	"	5,000	....	G	Opt.	16	2	5½	5	....	206.3	*	"	"	"	P	"	"	Doub.	Mea	M. & B.	"	Kingston	"	M
57	Reliance	"	5,000	...	G3	"	16	3	5½	5	....	301.4	*	"	....	"	"	"	"	"	"	"	"	"	"	"
58	Reliance	"	7,000	...	H	"	18½	3	5½	5	....	301.4	*	"	....	"	"	"	"	"	"	"	"	"	"	"
59	Reliance	"	7,000	...	H4	"	18½	4	5½	5	....	412 6	*	"	....	"	"	"	"	"	"	"	"	"	"	"
60	Reliance	"	10,000	....	K	"	18½	4	5½	5	....	412 6	*	"	....	"	"	"	"	"	"	"	"	"	"	"
61	Reo	Express	600	650	J	6 x4	9	1	4½	6	9.0	106.3	L	"	Side	"	T	T	"	Sing	....	Dry C.	Opt.	Own	"	"

ABBREVIATIONS:—**Body:** Exp., Express; Del., Delivery; Plat., Platform; Opt., Optional (where body is optional, price usually refers to chassis alone. **Type of Cylinder:** T., Tee-Head; L., L-Head; H., Valves-in-the-Head; *, Two-cycle motor. **Cooling:** A., Air; W., Water. **Circulation:** T., Thermo-Syphon System; P., Pump. **Radiation:** C., Cellular Radiator; T., Tubular Radiator. **Ignition:** H. T., High-Tension; L. T., Low-Tension; M. P., Magnetic Spark Plug; A.-K., Atwater Kent Generator; M., Magneto; B., Storage Battery; C., Dry Cells. **Gasoline Feed:** G., Gravity Feed; P., Pressure Feed. **Motor Lubrication:** C., Circulating; M., Mechanical Oiler; G., Oil Fed with Fuel; V., Vacuum System

Clutch, Gearset and Chassis Specifications of A. L. A. M. Commercial Cars for 1911

Table No.	NAME	CHASSIS MODEL	TRANSMISSION								BRAKES		RUNNING GEAR						BEARINGS										
			CLUTCH		GEARSET														Crankshaft		Camshaft								
			Type	Friction Surface	Type	No. Spds	Location	Drive	Car Drives Thru	Rear Axle	Service	Em.	Wheel Base	Front Tires	Rear Tires	Front Sp'gs	Rear Springs	Front Axle	Type	No.	Type	No.	Gearset	Front Wh'ls	Rear Axle	Clutch Sp'dle	Clutch Thrust	Str'ng Knu'l	Str'ng Gear
1	Alco	5-3 Ex.	M. D.	S. & B.	Sel.	3	Amid.	C	R	Dead	Int.	Int.	111	36x5	36x4*	½ El	½ El	R	Plain	3	Plain	3	Ball	Roll	Roll	Ball	Ball	Ball	Plain
2	Atlas	L	"	R	"	3	U. M.	S	S	Float	Ext. T.	"	102	32x4½	32x4½	"	"	I	Roll	3	"	"	Roll	"	"	Roll	Roll	Plain	"
3	Autocar	XXI-B	"	I. & B.	Prog.	3	Amid.	"	"	"	"	"	97	34x3½	34x4	"	Plat	T	Ball	2	Plain	2	"	"	"	"	"	"	Ball
4	Brush	M	"	S, I.&B.	Plan.	2	"	C	R	Dead	Int.	R.W.	88	30x3	30x3	Coil	Coil	W	Plain	2	"	2	B. & P.	Ball	Ball	Plain	Ball	"	Plain
5	Buick	2-A	Cone	L. & I.	"	2	"	"	"	"	"	Int.	92	32x4	32x4	¾ El	½ El	I	"	2	"	2	....	"	"	..	"	"	"
6	Buick	2-A	"	"	"	2	"	"	"	"	"	"	92	32x4	32x4	"	"	"	"	2	"	2	....	"	"	..	"	"	"
7	Cartercar	T	....	....	Frict.	..	"	"	..	"	"	R.W.	98	34x2½	34x2½	½ El	"	T	"	2	"	3	Ball	"	"	Ball	"	"	Ball
8	Cartercar	T	....	....	"	.	"	"	..	"	"	"	98	34x2½	34x2½	"	"	"	"	2	"	3	"	"	"	"	"	"	"
9	Cartercar	T	....	....	"	..	"	"	..	"	"	"	98	34x2½	34x2½	"	"	"	"	2	"	3	"	"	"	"	"	"	"
10	Franklin	L-5	M. D.	S. & B	Sel.	3	"	S	S	Semi-F.	Ext. T.	Ext.	94	36x5½	36x5½	El	"	"	"	5	"	3	Roll	Roll	B. & R.	Plain	"	"	Plain
11	Franklin	L-5	"	"	"	3	"	"	"	"	"	"	94	36x5½	36x5½	"	"	"	"	5	"	3	"	"	"	"	"	"	"
12	Franklin	L-5	"	"	"	3	"	"	"	"	"	"	96½	37x5	37x5	"	"	"	"	5	"	3	"	"	"	"	"	"	"
13	Franklin	L-5	"	"	"	3	"	"	"	"	"	"	96½	36x5½	36x5½	"	"	"	"	5	"	3	"	"	"	"	"	"	"
14	Garford	1-Ton	....	....	Frict.	..	"	C	R	Dead	.....	..	Opt.	34x3	34x3½	½ El	Plat	I	"	3	"	4	....	"	Roll	..	..	"	Ball
15	Garford	2-Ton	....	....	"	..	"	"	"	"	Ext.	..	"	34x3½	36x3*	"	"	"	"	3	"	4	....	"	"	..	..	"	"
16	Garford	3-Ton	....	....	"	..	"	"	"	"	"	..	"	34x4	36x3½*	"	"	"	"	3	"	4	....	"	"	..	..	"	"
17	Glide	Tour.	M. D.	S	Sel.	3	R. A.	S	T	Semi-F.	Int.	Ext.	120	36x4½	36x4½	"	½ El	"	"	5	"	3	Roll	"	"	Plain	Ball	"	Plain
18	Grabowsky	.....	"	I	Plan.	2	Amid.	C	R	Dead	Ext. T.	Int.	102	32x3½	32x3½	"	Plat	R	"	2	"	2	Plain	"	"	..	"	"	"
19	Grabowsky	.....	"	"	"	2	"	"	"	"	"	"	127	32x4	32x4	"	"	"	"	2	"	2	"	"	"	..	"	"	"
20	Grabowsky	.....	"	"	"	2	"	"	"	"	"	"	127	34x4	34x4	"	"	"	"	2	"	2	"	"	"	..	"	"	"
21	Grabowsky	.....	"	"	"	2	"	"	"	"	"	"	127	34x5	36x3½*	"	"	"	"	2	"	2	"	"	"	..	"	"	"
22	Hewitt	10-Ton	Cone	R. & I.	"	2	"	"	"	"	"	"	138	36x5*	44x7*	"	½ El	I	"	3	"	3	"	"	"	Plain	"	"	"
23	Hewitt	7-Ton	"	"	"	2	"	"	"	"	"	"	138	5*	5*	"	"	"	"	3	"	3	"	"	"	"	"	"	"
24	Hewitt	5-Ton	"	"	"	2	"	"	"	"	"	"	138	4*	5*	"	"	"	"	3	"	3	"	"	"	"	"	"	"
25	Hewitt	3-Ton	"	"	"	2	"	"	"	"	"	"	136	5	4*	"	"	R	"	3	"	3	"	"	"	"	"	"	"
26	Hewitt	2-Ton	"	"	"	2	"	"	"	"	"	"	112	4	3½*	"	"	"	"	3	"	3	"	"	"	"	"	"	"
27	Hewitt	1-Ton	"	L. & I.	Sel.	3	"	"	"	"	"	"	94	36x4½	36x4½	"	"	"	"	3	"	3	Roll	"	"	"	"	"	"
28	Jackson	20	M. D.	"	Plan.	2	S. M.	S	"	Semi-F.	Int.	"	100	36x2	36x2	El	El	I	"	2	"	2	Plain	Ball	R & B	"	Plain	"	Ball
29	Jackson	C	"	"	"	2	"	C	"	"	Ext.	Ext.	104	32x3½	32x3½	"	"	T	"	2	"	2	"	"	Roll	"	"	"	Plain
30	Kisselkar	A	Cone	L	Sel.	4	Amid.	"	"	Dead	Ext. J. S.	Int.	144	36x4	36x4*	½ El	½ El	I	"	3	"	3	Ball	Roll	"	Ball	Ball	Roll	..
31	Knox	64	M. D.	S. & C.	"	3	U. M.	S	TR&R	Float	Ext.	"	136	38x5½	38x5½	"	¾ El	"	"	5	"	3	"	"	"	Plain	"	"	Plain
32	Knox	M-4	"	"	"	3	Amid.	C	R	Dead	Ext. J. S.	"	128	40x6	40x5½*	"	½El	"	"	5	"	3	Roll	"	"	"	"	"	"
33	Knox	M-3	"	"	"	3	"	"	"	"	"	"	145	40x6	40x5½*	"	"	"	"	5	"	3	"	"	"	"	"	"	"
34	Knox	8	"	"	"	3	"	"	"	"	"	"	168	40x5	40x4*	"	"	"	"	4	"	4	"	"	"	"	Ball	"	"
35	Knox	R-5	"	"	"	3	U. M.	"	"	"	"	"	103	34x4	34x3½*	"	"	"	"	5	"	3	Ball	"	"	"	Roll	"	"
36	Knox	R-7	"	"	"	3	"	"	"	"	"	"	125	34x4	34x3½*	"	"	"	"	5	"	3	"	"	"	"	"	"	"
37	Knox	R-14	"	"	"	3	Amid.	"	"	"	"	"	125	34x4	34x3½*	"	"	"	"	5	"	3	Roll	"	"	"	"	"	"
38	Knox	R-15	"	"	"	3	"	"	"	"	"	"	149	36x4	36x4*	"	"	I	Plain	5	Plain	3	"	Roll	Roll	Plain	Ball	Roll	Plain
39	Knox	R-16	"	"	"	3	"	"	"	"	"	"	149	36x4	36x5*	"	"	"	"	5	"	3	"	"	"	"	"	"	"
40	Knox	R-17	"	"	"	3	"	"	"	"	"	"	149	36x5	36x5*	"	"	"	"	5	"	3	"	"	"	"	"	"	"
41	Knox	G-14	"	"	"	3	"	"	"	"	"	"	125	34x4	34x3½*	"	"	"	"	5	..	..	"	"	"	"	"	"	"
42	Lambert	.....	.....	.....	Frict.	..	"	"	"	Semi-F.	Int.	"	132	4	6	..	.....	R	"	3	Plain	3	....	Plain	Plain	..	"	Plain	"
43	McIntyre	519	M. D.	S. & F.	Plan.	2	U. M.	"	"	Dead	Ext.	"	77	38x1½	38x1½	..	.....	"	"	2	"	3	Plain	Roll	Roll	Plain	Plain	"	"
44	McIntyre	211	"	"	"	2	"	"	"	"	"	"	86	34x1½	34x2	..	.....	"	"	2	"	3	"	"	"	"	"	"	"
45	McIntyre	251	"	"	"	2	"	"	"	"	"	"	86	34x1½	34x2	..	.....	"	"	2	"	3	"	"	"	"	"	"	"
46	McIntyre	VII	"	"	"	2	"	"	"	"	"	"	86	34x1¼	34x2	..	.....	"	"	2	"	3	"	"	"	"	"	"	"
47	Morgan	B	"	S. & B.	"	2	Amid.	"	"	"	Ext. J. S.	R. W	141	36x6	36x5*	..	.....	I	B. & P.	3	"	3	"	"	"	..	..	Roll	Ball
48	Overland	37	"	I	"	2	R. A.	S	T	Semi-F.	Int.	Ext.	102	33x4	33x4	½ El	El	"	Plain	5	"	3	R. & B.	Ball	R. & B.	Plain	Ball	Plain	"
49	Packard	3-Ton	"	S. & Sp.	Sel.	3	J. S.	C	R	Dead	Int. J. S.	Int.	144	34x4	36x4*	"	½ El	R	"	3	"	4	Ball	Roll	Roll	Ball	"	Ball	Plain
50	Peerless	4-Ton	Cone	L. & C.	"	4	"	"	"	"	Ext. J. S.	"	151	36x5	40x5*	"	"	"	"	3	"	2	"	"	"	Plain	"	P&B	P&B
51	Peerless	3-Ton	"	"	"	4	"	"	"	"	"	"	151	36x4	40x4*	"	"	"	"	3	"	2	"	"	"	"	"	"	"
52	Pope-Hartford	W	"	"	"	4	Amid.	S	T&R	Float	Ext.	"	136	38x5½	39x6	"	Plat	I	"	3	"	3	Plain	"	R & B	"	"	Roll	Roll
53	Pope-Hartford	W	"	"	"	4	"	"	"	"	"	"	136	38x5½	39x6	"	"	"	"	3	"	3	"	"	"	"	"	"	"	"
54	Pope-Hartford	W	"	"	"	4	"	"	"	"	"	"	136	38x5½	39x6	"	"	"	"	3	"	3	"	"	"	"	"	"	"	"
55	Randolph	C-2	"	L. & I.	"	4	"	C	R	Dead	Ext. J. S.	R.W.	96½	34x3	36x3½	"	El	T	"	2	"	2	Ball	"	Roll	Ball	"	Plain	Plain
56	Reliance	G	M. D.	S. & B.	Prog.	3	"	"	"	"	J. S.	"	122	32x4	32x3*	"	Plat	I	"	3	..	..	B & R	"	"	"	Roll	Roll	Ball
57	Reliance	G-3	"	"	"	3	"	"	"	"	"	"	122	36x4	36x3*	"	"	"	"	4	..	..	"	"	"	"	"	"	Roll
58	Reliance	H	"	"	"	3	"	"	"	"	"	"	140	36x5	36x3½*	"	½ El	"	"	4	..	..	"	"	"	"	"	"	Ball
59	Reliance	H-4	"	"	"	3	"	"	"	"	"	"	140	36x5	36x3½*	"	"	"	"	5	..	..	"	"	"	"	"	"	"
60	Reliance	K	"	"	"	3	"	"	"	"	"	"	138	36x6	36x5*	"	"	"	"	5	..	..	"	"	"	"	"	"	"
61	Reo	J	"	"	Plan.	2	U. M.	"	"	Semi-F.	Ext.	R.W.	78	29x3½	29x3½	¾ El	El	"	"	3	Plain	2	Plain	Ball	"	..	..	Plain	Plain

ABBREVIATIONS:—Clutch: M. D., Multiple Disk; S., Steel; I., Iron; R., Raybestos: L., Leather; B., Bronze; C., Cork (Inserts); F., Fabric; Sp., Special Composition; A., Asbestos. **Gearset Location:** J. S., Jack Shaft; R. A., Rear Axle; Amid., Amidships: U. M., Unit with Motor; S. M., Beside Motor. **Drive:** S., Shaft; C., Chain. **Car Drives Through:** R., Radius Rods; T., Torsion Tube; T. R., Torsion Rod; S., Springs; C., Chain Cover. **Rear Axle:** Float., Floating; Semi-F., Semi-Floating. **Brakes:** Int., Internal Expanding; Ext. External Contracting; R. W., On Rear Wheels; J. S., On Jack Shaft; T., On Transmission. **Springs:** ½ El., Semi-Elliptic; El., Elliptic; Plat., Platform. **Front Axle:** I., I-Beam; T., Tubular; C., Channel; W., Wood; R., Rectangular. *Wheels are Dual

Motor Specifications of Commercial Cars Manufactured by Members of A. L. A. M for 1911 Season

Table No.	NAME	BODY	Load, Lbs.	Price	Chassis Model	Load Platform in Feet	Total Len'th in Ft.	No. Cyl.	Bore	Stroke	H. P. A.L.A.M.	Cyl. Vol.	Type Cyl.	Cyl., How Cast	Loc. of Valves	COOLING Type	COOLING Circu-lation	COOLING Radia-tor	IGNITION Type	IGNITION System	IGNITION Magneto	IGNITION Current Source	CARBURETER Design	CARBURETER Gasoline Feed	Motor Lubri-cation
62	Reo	Optional	1,500	750	H	7 x4	12	1	4½	6	9.0	106.3	L	Sep.	Side	W	T	T	H. T.	Sing.	.....	Dry C.	Own	G	M
63	Sampson	"	1,000	.....	½-Ton	Opt.	11	2	4½	4½	18.0	168.4	"	"	"	"	"	"	"	Dual	.....	M. & B	.....	"	C
64	Sampson	"	2,000	.....	1-Ton	"	Opt.	4	4	5	25.6	251.3	"	Pairs	R. Side	"	"	"	"	"	.....	"	.....	"	"
65	Sampson	"	4,000	.....	2-Ton	"	"	4	4½	5½	32.4	349.9	"	"	"	"	"	"	"	"	.....	"	.....	"	"
66	Sampson	"	6,000	.....	3-Ton	12x6	"	4	4½	5½	32.4	349.9	"	"	"	"	"	"	"	"	.....	"	.....	"	"
67	Sampson	"	8,000	4,500	4-Ton	14 x6	20	4	5	5½	40.0	431.9	"	"	L. Side	"	"	"	"	"	.....	"	.....	"	"
68	Sampson	"	10,000	5,000	5-Ton	14 x6	20	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	.....	"	.....	"	"
69	Stearns	Platform	10,000	3,550	3-5 Ton	12 x6	19	4	4½	5½	34.3	334.0	"	Bloc.	"	"	P	C	"	"	Bosch	M. & C.	"	"	"
70	Stoddard	Delivery	1,000	1,350	20	4½x3½	13	4	4½	5½	25.6	226.2	"	"	Side	"	P	C	"	"	Split'f	"	Own	"	"
71	White	Express	1,500	2,100	G-B-E	6½x3½	...	4	4	5½	22.5	234.0	"	"	"	"	P	C	"	Sing	Bosch	Mag.	Stromberg	"	"
72	White	Optional	3,000	3,000	G-T-B	...	...	4	3½	5½	22.5	234.0	"	"	"	"	"	"	"	"	"	"	Own	"	"
73	White	Platform	6,000	3,850		13½x64		4	5½	5½	22.5	234.0	"	"	"	"	"	"	"	"	"	"	"	"	"

ABBREVIATIONS:—Body: Exp., Express; Del., Delivery; Plat., Platform; Opt., Optional (where body is optional, price usually refers to chassis alone. **Type of Cylinder:** T., Tee-Head; L., L-Head; H., Valves-in-the-Head; *, Two-cycle motor. **Cooling:** A., Air; W., Water **Circulation:** T., Thermo-syphon System; P., Pump. **Radiator:** C., Cellular Radiator; T., Tubular Radiator. **Ignition:** H. T., High-Tension; L. T., Low-Tension; M. P., Magneto Spark Plug: A.-K., Atwater Kent Generator; M., Magneto; B., Storage Battery; C., Dry Cells. **Gasoline Feed:** G., Gravity Feed; P., Pressure Feed. **Motor Lubrication:** C., Circulating; M., Mechanical Oiler; G., Oil Fed with Fuel; V., Vacuum System

Clutch, Gearset and Chassis Specifications of A. L. A. M. Commercial Cars for 1911

Table No.	NAME	CHASSIS MODEL	TRANSMISSION CLUTCH Type	CLUTCH Friction Surface	GEARSET Type	GEARSET No. Spds	GEARSET Location	Drive	Car Drives Thru	Rear Axle	BRAKES Service	BRAKES Em.	RUNNING GEAR Wheel Base	RUNNING GEAR Front Tires	RUNNING GEAR Rear Tires	RUNNING GEAR Front Sp'gs	RUNNING GEAR Rear Springs	RUNNING GEAR Front Axle	BEARINGS Crankshaft Type	BEARINGS Crankshaft No.	BEARINGS Camshaft Type	BEARINGS Camshaft No.	BEARINGS Gearset	BEARINGS Front Wh'ls	BEARINGS Rear Axle	Clutch Sp'dle	Clutch Thrust	Str'ng Knu'l	Str'ng Gear
62	Reo	H	M. D.	S. & B	Plan.	2	U. M.	C	R	Dead	Ext. J. S.	Ext.	90	36x2	36x2½	½ El	El	I	Plain	3	Plain	2	Plain	Ball	Roll			Plain	Plain
63	Sampson	½-Ton	"	A. & S.	Sel.	3	Amid.	S	T&R	Float	R. W.	R.W.	94	32x3½	32x3½	"	¾ Flat	R	"	2	"	2	Roll	"	R & B	Plain	Ball	"	"
64	Sampson	1-Ton	"	"	"	3	"	C	TRC	Dead	"	"	110	32x3½	32x3½	"	½ El	"	"	3	"	3	"	"	Roll	"	"	"	"	"
65	Sampson	2-Ton	"	"	"	3	"	"	"	"	"	"	120	32x4	32x5	"	"	"	"	3	"	3	Ball	"	"	"	"	"	"	"
66	Sampson	3-Ton	"	"	"	3	"	"	"	"	"	"	144	36x4½	36x4*	"	.....	"	"	3	"	3	"	"	"	"	"	"	"	"
67	Sampson	4-Ton	Cone	L. & I.	"	4	"	"	"	"	Ext. T.	"	148	36x5	36x5*	"	½ El	I	"	3	"	3	"	"	"	"	"	Roll	Roll
68	Sampson	5-Ton	"	"	"	4	"	"	"	"	"	"	153	36x6	36x6*	"	"	"	"	3	"	3	"	"	"	"	"	"	"	"
69	Stearns	3-5-Ton	M. D.	S. & R.	"	3	J. S.	R	Dead	J. S.	R.W.	"	144	34x5	38x4*	"	"	"	"	3	"	4	"	"	"	"	Ball	"	Plain	"
70	Stoddard	20	Cone	L. & I.	"	3	R. A.	S	T	Semi-F.	Ext.	Int.	112	33x4	32x4	"	¾ El	"	"	3	Roll	"	Roll	"	"	"	Fla	"	Plain	"
71	White	G-B-E	"	"	"	4	Amid.	S	R	"	"	"	120	34x4	34x4½	"	¾ El	"	Ball	2	Roll	"	.....	Ball	Ball	"	"	Ball	Ball	Ball
72	White	G-T-B	"	"	"	4	"	S	"	"	"	"	144	36x4	36x4*	"	"	"	"	2	"	"	"	"	"	"	"	"	"	"
73	White	.....	"	"	"	4	"	C	R	Dead	Ext. J. S	"	144	36x5	40x4*	"	Plat	"	"	2	"	"	.....	"	"	"	"	"	"	"

ABBREVIATIONS:—Clutch: M. D., Multiple Disk; S., Steel; I., Iron; R., Raybestos; L., Leather; B., Bronze; C., Cork (Inserts); F., Fabric; Sp., Special Composition; A., Asbestos. **Gearset Location:** J. S., Jack Shaft; R. A., Rear Axle; Amid., Amidships; U. M., Unit with Motor S. M., Beside Motor. **Drive:** S., Shaft; C., Chain. **Car Drives Through:** R., Radius Rods; T., Torsion Tube; T. R., Torsion Rod; S., Springs; C., Chain Cover. **Rear Axle:** Float., Floating; Semi-F., Semi-Floating. **Brakes:** Int., Internal Expanding; Ext., External Contracting; R. W., On Rear Wheels; J. S., On Jack Shaft; T., On Transmission. **Springs:** ½ El., Semi-Elliptic; El., Elliptic; Flat., Platform. **Front Axle:** I., I-Beam; T., Tubular; C., Channel; W., Wood; R., Rectangular. *Wheels are Dual

History of the Shows

Colonel George Pope Tells of the Pioneer Days of the Exposition When There was a Total of Only Fifty-One Exhibitors in All

By George Pope
Chairman Show Committee

IT is a far cry from the crude, shapeless, intolerably noisy, balky, almost useless mass of complicated machinery on wheels—in other words, the motor car of a decade and a half ago—to the more luxurious, efficient, powerful and speedy motor car of today. This is an age of rapid progress and people are becoming accustomed to wonderful development in phenomenally short periods of time, but perhaps the most remarkable example of rapid development is exemplified in the motor car. In no manner can this development be observed as readily as through the motor-car shows held in this country.

Dates Back to 1898

Although the show period began as far back as 1898, the first real motor car exhibition did not take place until 2 years later. A few cars were shown in the same exhibitions with bicycles both in New York and Chicago shows in 1898 and 1899. The first real show was held in Madison Square garden during the week of November 3-10, 1900.

At this first show there were thirty-one exhibitors of complete motor cars and twenty concerns showing parts and accessories, but there were not a sufficient number to fill the large area of floor space in Madison Square garden and so a flat oval track for showing the cars in motion was built in the garden and on the roof was erected an incline designed to show the hill-climbing capabilities of the machines. Persons who wished to cross from the enclosure to the booths on the outside of the track were transported over a bridge spanning the track.

Steamers Among the Pioneers

It is rather amusing at this day to contemplate the exhibits that marked the first show in 1900. Steam-propelled vehicles were easily in predominance, with a goodly number of electrics, while gasoline machines showed a bad third, in striking contradistinction to the order of today.

There are a number of concerns—big powers in the industry of the present time—who were represented at the first motor-car show. For instance, the Winton Motor Carriage Co. exhibited a two-passenger phaeton that had made an excellent run between Cleveland and New York—a wonderful achievement 11 years ago—and there also was shown the Winton racing car and a delivery wagon. All these were driven by single-cylinder gasoline engines. A single-cylinder Packard car and a three-wheeled contrivance also were included in the gasoline division, the latter being shown by the Knox Automobile Co. One

In the Big Garden

Association of Licensed Automobile Manufacturers Secure Control of Building in 1906—Growth of the Affair Since that Time

real racy car was a two-passenger motorette constructed by the Peerless Mfg. Co.; it employed an imported de Dion motor. There also was a surrey displayed by the French Brothers, and attracted considerable attention because it had come down over the roads from Boston. Haynes and Apperson then were associated and their vehicles were patronized by much interest and curiosity. The only three-cylinder engine was mounted in a car shown by the now defunct American Bicycle Co. Easily one of the leaders was the Locomobile—but at that time a steam vehicle—and no fewer than ten different models were on exhibition.

The most important factor in the electrical field was the Riker Motor Vehicle Co., which long since has been taken over by the Electric Vehicle Co. The Woods Motor Vehicle Co., of Chicago, also was represented strongly, as well as the Baker Motor Vehicle Co., which had furnished the sensation of the show by producing a 500-pound electric runabout equipped with a battery weighing only 160 pounds. There also were a number of motor bicycles and three-wheeled machines, but all told, there was considerable space to spare.

Despite the fact that it was the first show the exhibition was financially successful. Motor cars were very much of a novelty at that time and people flocked to the garden in 1900 the same as they do today. The cost of putting on the first show was $11,000, which did not include the cost of decorations, which were paid for by the exhibiting concerns. As each company could arrange its booth as desired, it goes without saying that there was no uniformity in signs and decorations.

The Second Show

The second national show was held in the garden during the week of November 2-9, 1901. As striking evidence of the growth of the industry in 1 year is cited the fact that at the second show there were ninety-three exhibitors as compared with a total of fifty-one exhibitors at the first show. At the second show the track was omitted, but persons were given exhibitions around the basement floor and also in the block around the garden. Several individuals who owned foreign cars loaned them for exhibition purposes, so that the second show really had an international flavor, however weak. The foreign machines shown were a Darracq, a Napier, a Renault, a Mercedes and a Mors car shown by Foxhall Keene.

Such rapid strides had been made in the development of the industry that it became apparent that some national association of manufacturers would be needed to assume control if the industry hoped to develop commensurate with its prospects, as the commercial side of the motor car just was beginning to assert itself. The National Association of Automobile Manufacturers was organized. After several conferences it was decided to hold the next show at the beginning of the following years.

First Foreign Exhibitor

The date was January 17-24, 1903, and more than 150 exhibitors were represented. For the first time a foreign exhibitor was represented directly, the Paris Automobile Co. having space.

The fourth show was held from January 16-23, 1904. One hundred and eighty-five exhibitors were represented this time. A year later the industry had grown to such an extent that many companies applying for space had to be refused. The fifth show was held from January 14-21, 1905, and 250 exhibitors had space.

After the 1905 show the Association of Licensed Automobile Manufacturers secured control of the expired contract that had existed between the Madison Square Garden Co., the National Association of Automobile Manufacturers and the Automobile Club of America, and from that time the entire aspect of the national show underwent a great change. Previous to this transfer of control the exhibitors had been allowed to do pretty much as they pleased. Each firm regulated the arrangement and display of its own product and as the result there was a confusing conglomeration of color as regards bunting, ununiform signs and inharmonious decorative design. The Association of Licensed Automobile Manufacturers determined to remedy this confusion and to make this show an exhibition of uniformity that would give each company exhibiting an equal chance to interest the buying public in the merit of their wares rather than to hypnotize them with glittering electrical signs and a plethora of irregularity, in no way indigenous to the actual product of display.

The first show under the auspices and management of the A. L. A. M. and the sixth to be held in the garden took place the week of January 13-20, 1906, and at which fifty exhibitors of cars and 170 manufacturers of parts and sundries were represented.

Under the same auspices as its predecessor, the seventh annual show was held in the garden during the week of January 12-19, 1907. More than 7,000 people attended the opening. A striking indication and strong emphasization of the deep interests of the buying now manifested in motor cars. The number of makers who showed cars was forty-two and there were 202 accessories exhibits. The eighth show was held at the same place November 3-10, 1907. There were sixty-eight exhibitors of complete cars, a number of commercial vehicles and about 225 accessories exhibits.

An early show, however, was found to be not nearly so advantageous as an exhibition held at the beginning of the year, and for this reason the ninth show occupied the week of January 16-23, 1909. No fewer than 117 complete cars, twenty-eight chassis, thirty-seven electric vehicles and a number of commercial cars were shown.

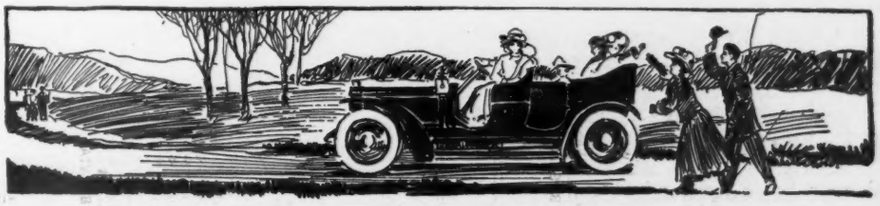
The Tenth Show

The tenth national show held last year during the week of January 8 to 15 was the greatest ever held in America, if not in the world. It was bigger, better and more interesting than any other of its predecessors. The applications for many additional square feet of floor space over previous years was the keynote of the wonderful growth of the industry in America during the past decade. There were 323 displays, of which fifty-four were exhibits of complete cars, twenty-three were motor cycle manufacturers, 246 comprised the exhibits of accessories and cars.

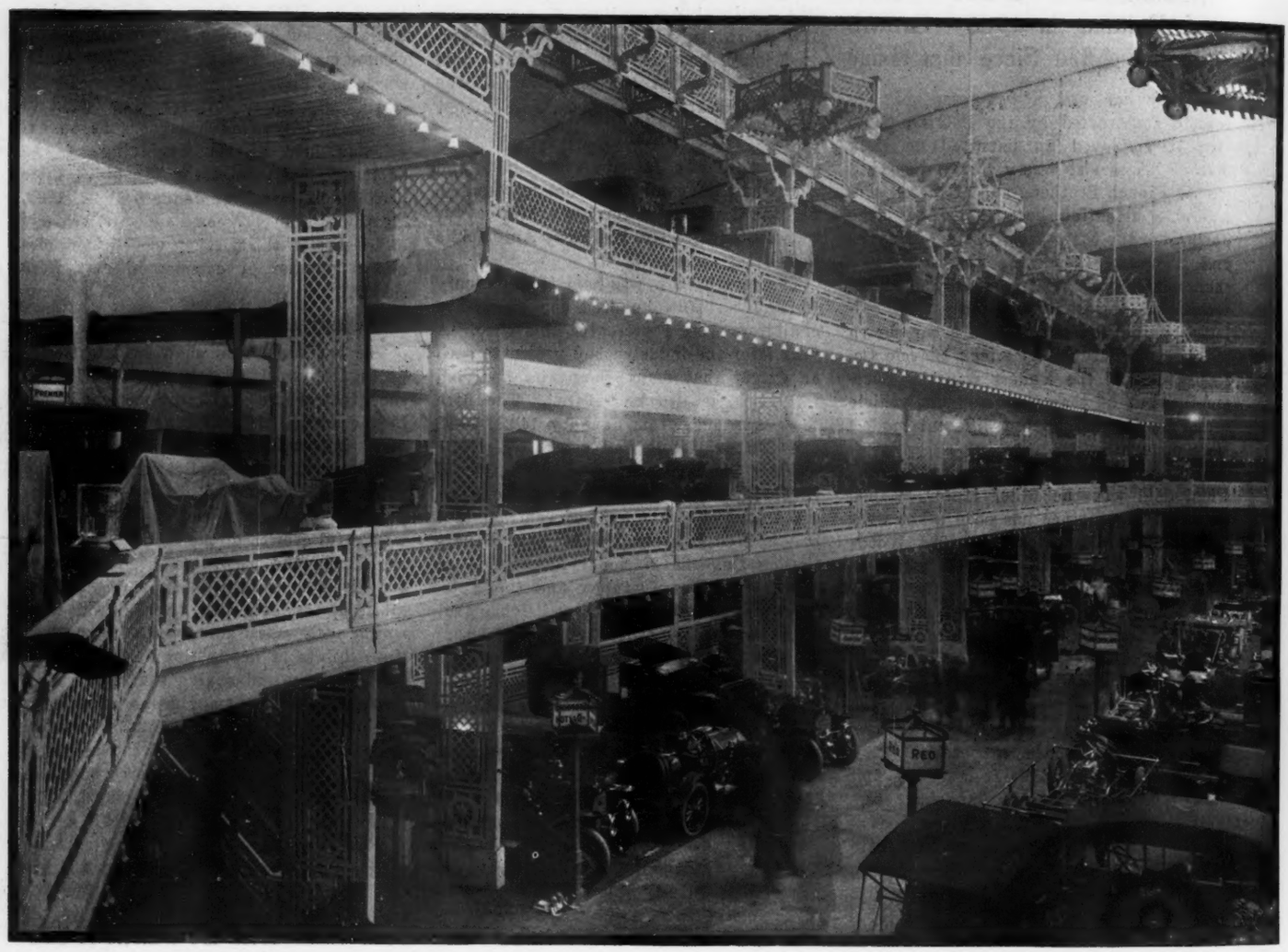
There is no gainsaying that this year's show is the most magnificent assemblage of motor cars, motor cycles and accessories ever held in the history of the industry. For both periods of the show there are more than 679 different displays. The number of exhibitors for the part 1 period is 393, of which sixty-seven are exhibits of gasoline pleasure vehicles and 326 exhibits of accessories and parts. For the part 2 period there are 286 exhibitors, of which twenty-seven are exhibits of gasoline commercial vehicles, seven are exhibits of electric business and pleasure vehicles, eighteen are motor cycle exhibits, and 234 are exhibits of parts and accessories.

Although the show has been divided into two parts, pleasure cars and accessories occupying the first part and commercial vehicles, electric business and pleasure vehicles, motor cycles and accessories the second part, even this division has been inadequate to meet the demands for space. It goes without saying that the eleventh national show marks an epoch in the motor industry of the world.

It may be predicted, too, that future exhibitions will show as much development in both engineering features and comfort as has occurred in the past.



Crowds Invade Madison Square Garden



MADISON SQUARE GARDEN SHOW—RIGHT SIDE OF GALLERIES

Promoters of Show Hold Spectators In Check Until Finishing Touches Can Be Put on This, the Greatest Exhibition Ever Held in the Famous Madison Square Garden in New York

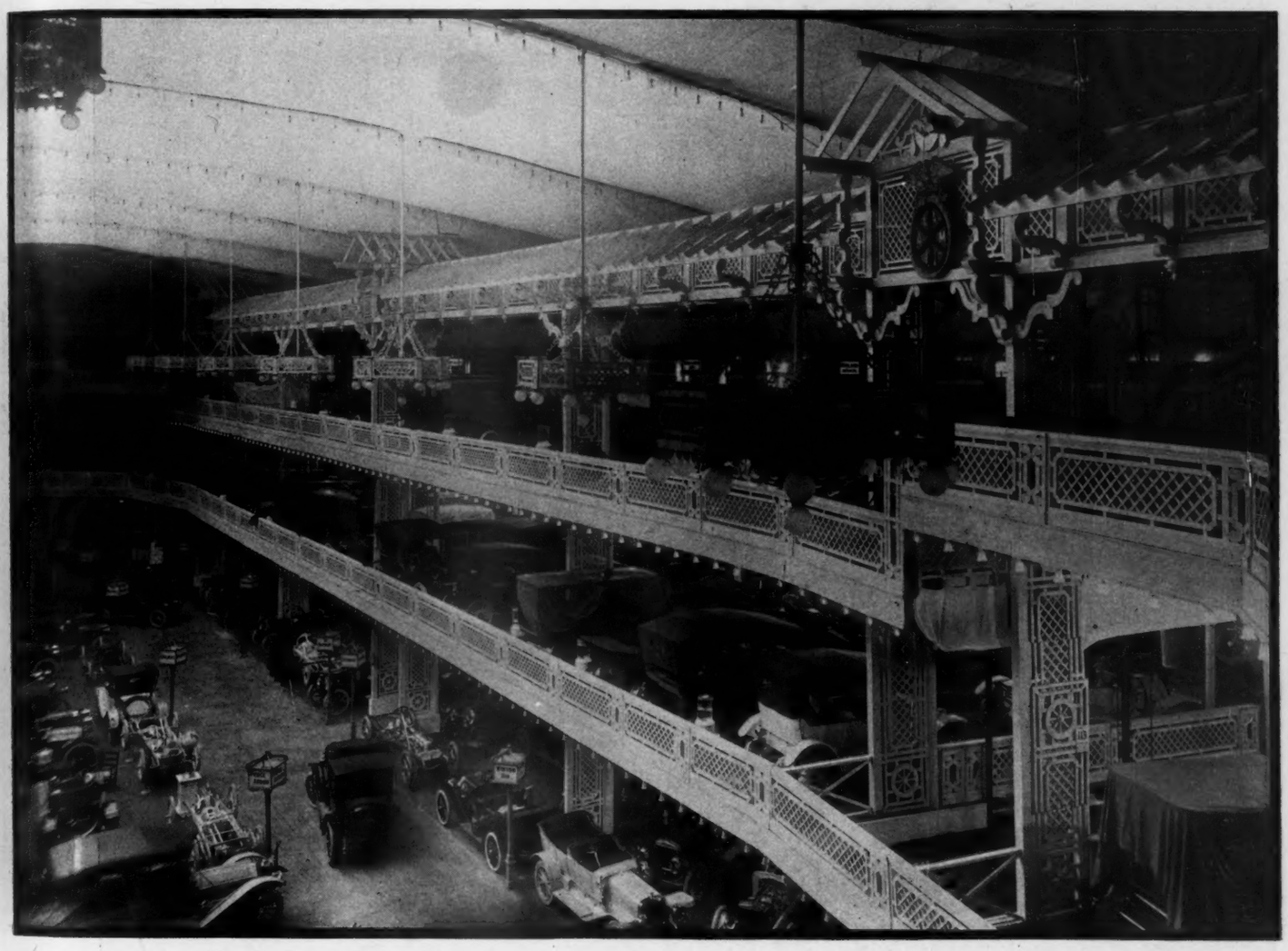
A LITTLE after the fixed hour of 8 o'clock set for the opening, the eleventh national motor car show, conducted by the Association of Licensed Automobile Manufacturers, opened in Madison Square garden, New York, Saturday night with a brilliancy of light and color heretofore never equaled at a motor car exhibition in this building. To be exact, the hands of the big clock had swung around to the full 15 minutes after the set hour; the vast crowd surged outside of the main entrance and extended, crowding the sidewalk, for more than a block in each direction; the sound of the motor exhaust, the shriek of the siren horn and the familiar honk honk filled Madison avenue and adjoining streets, but still the big doors remained closed.

A peep inside the big building answered the question. A hundered or more workmen were adding the last touches; scores were sweeping the rubbish and packing paper from the aisles; in another corner electricians were connecting the electric wires to the last few exhibition signs; at another place a staircase to the first balcony was being installed; in the basement a late arrival was getting into place; and in a dozen and one corners of the building the last minute jobs were being handled.

Finally there was a stampede of those who were in the building to the edge of the galleries; the band had struck up an opening air, the thousands of lights, shining starlike on the arched roof, were switched on, the big front doors opened, in flowed what seemed the endless seas of humanity, quickly engulfing the main floor exhibits and the show was opened for the 1911 session.

Those who were fortunate enough to have a point of vantage on the third balcony had a good opportunity of watching the human inundation. The black mass of spectators moved with a steady flow, first in stopped momentarily inside the entrance to get a first view of the terraced garden effect of decorations with the two balconies outlined in electricity, the massive electric chandeliers and endless strings of incandescent lights and brilliant predominating white of the decorating scheme. But their halt was but for a moment; those behind said "on" and the leaders where virtually sidetracked into the Stearns exhibit space at the right of the entrance, into the Stevens-Duryea at the left, or pushed bodily ahead into the Pack-

To See Opening of A. L. A. M. Show



MADISON SQUARE GARDEN SHOW—LEFT SIDE OF GALLERIES LOOKING TOWARDS MAIN ENTRANCE OF BUILDING

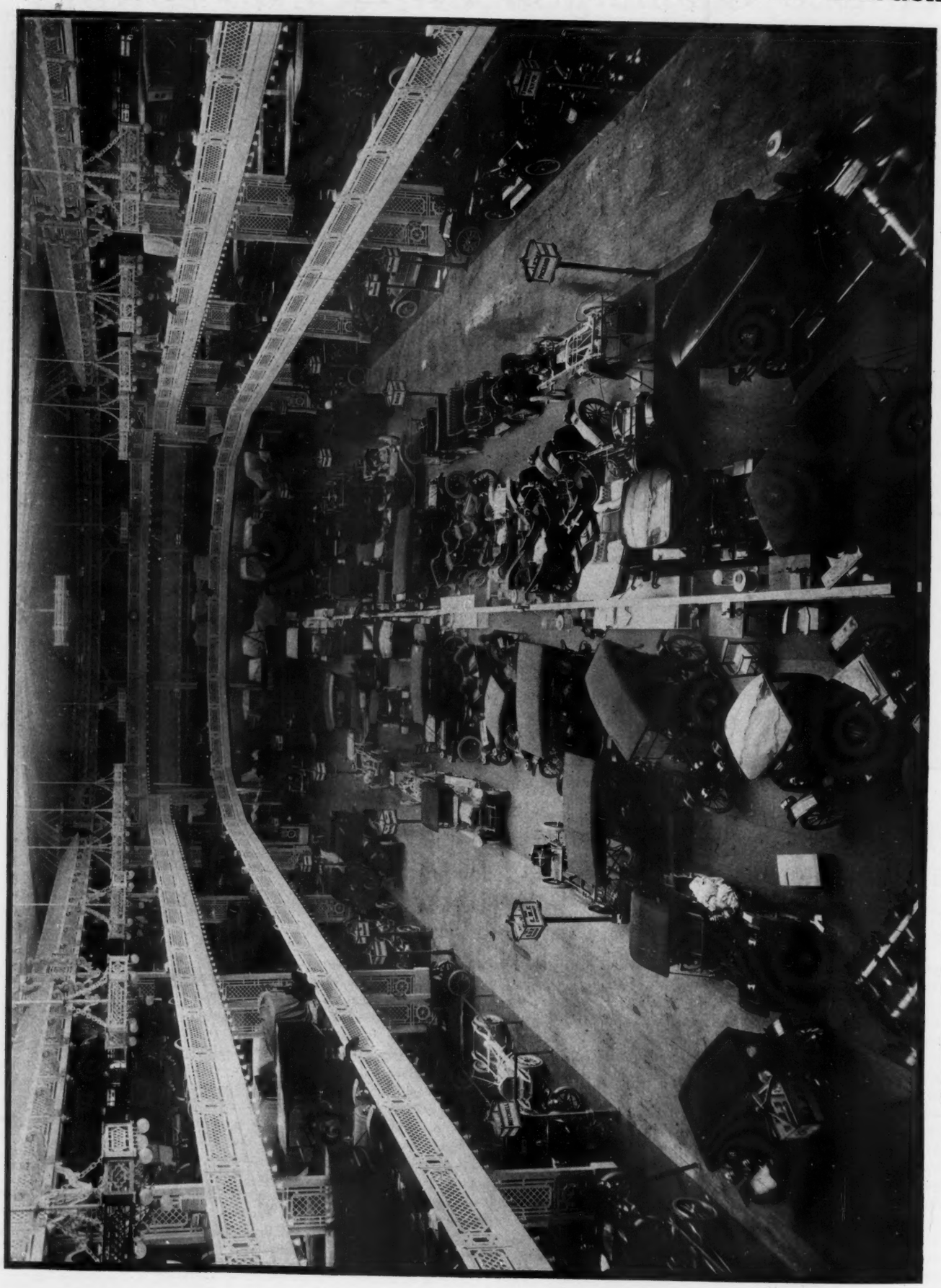
Terrace Garden Effect Comes Fully up to Expectations of the Seldenites—Trip Through the Show Discloses Two Hundred and Forty Nine Complete Motor Cars Ready for Inspection

ard, Thomas, Mitchell, E-M-F and a few other spaces close to the front door, the one exhibit space engulfing one space after another until nothing remained to the eye but the tops of the cars, surrounded by the waves of enthusiasts. Every space in the main floor was crowded in a minute or 2; then the invasion reached the first balcony, where twenty-two makers of cars have their 1911 chassis and cars, and where more than two-score of accessory makers exhibited. Here the victory of the onrushing tide was soon as complete as on the main floor. One floor higher up, on the second balcony, where heretofore there was never room for a car to be housed, sixteen makers have over fifty cars and fifteen chassis on exhibition. They soon fell victims to the invading hosts. In less than 20 minutes the entire sixty-seven car spaces were overrun and all of the accessory spaces from the basement to the farthest corner of concert hall. A like fate awaited those car exhibitors in exhibition hall, of which there are six. From this time on till the band played "Home, Sweet Home," after 11 o'clock, the crowd remained, migrating from exhibit space to exhibit space as their whims led them.

But these migrations were slow. Although the aisles are wider than ever before, it was impossible to go against the throngs and progress could only be made by moving along with the masses, which filled the aisles from side to side and from end to end. In the second and third balconies the big piles of debris, left from the decorators, had not all been removed and before the workmen had a chance to get away the human waves had struck them. They carried their big baskets on their shoulders and heads like the ancient Egyptians and brushed elbows with handsomely gowned women and men. The crowd paid little heed to the rubbish piles, which were a couple of feet high in places. They stormed them like true heroes and soon they were lost sight of. When the crowd was cleared out by a quarter to twelve the real cleaning up situation became apparent and before the sweepers began the basket brigade was placed in and completed the task it had tried to accomplish before the onrushing hosts struck them.

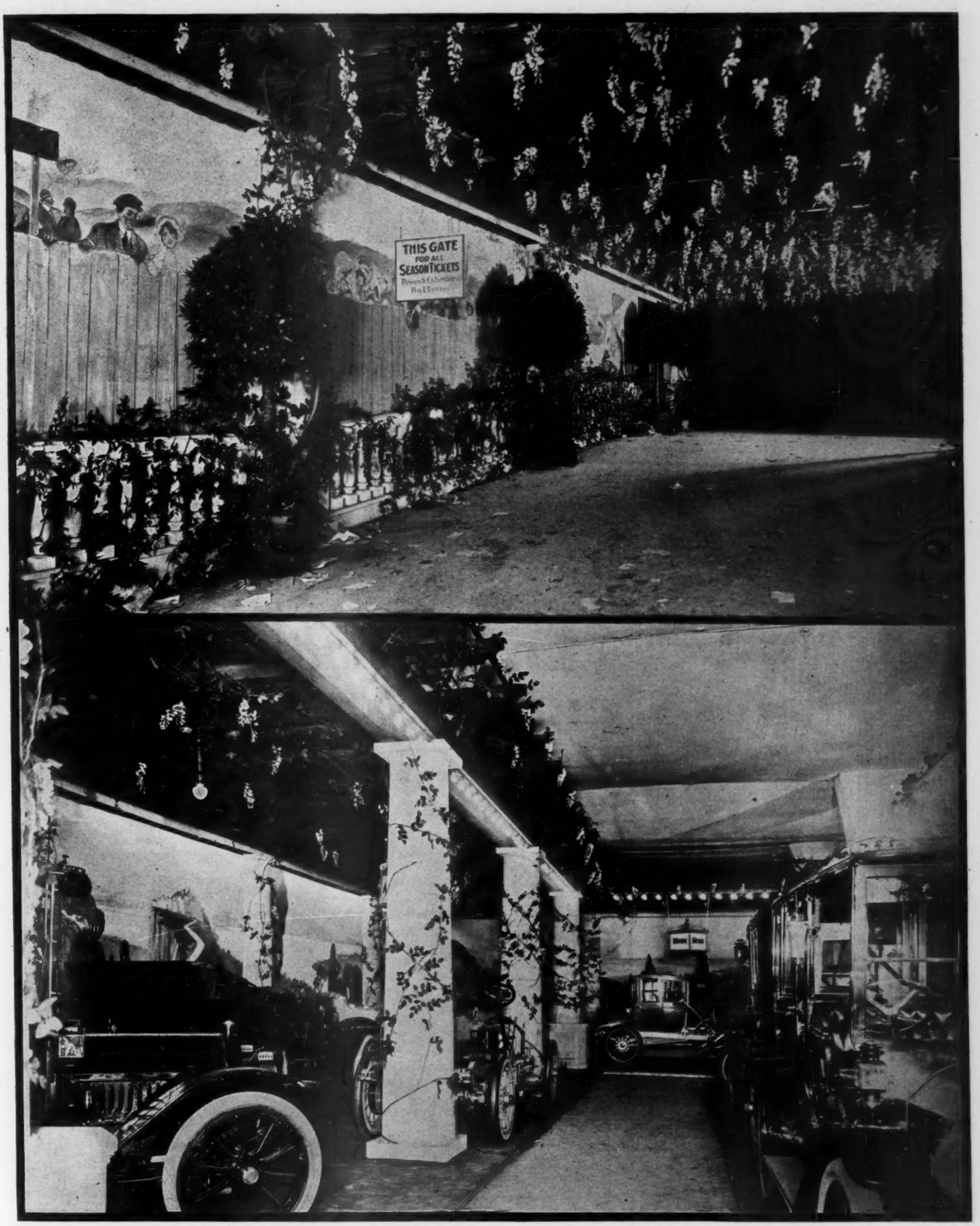
This year is beyond comparison with those of former years. There are sixty-seven car exhibitors alone, who show 249 complete cars, fitted with the varying body types, and fifty-five chassis. To house such an array would

Madison Square Embellishments in Terraced Garden



MADISON SQUARE GARDEN AS SEEN FROM THE THIRD BALCONY ABOVE THE MAIN ENTRANCE, SHOWING TERRACED GARDEN DECORATIONS

Style Sets New Mark In Decorative Art for Shows



THE UPPER ILLUSTRATION SHOWS THE GARDEN EFFECT IN THE ENTRANCE TO THE BUILDING, THE WALLS BEING A VINE-CLAD BALUSTRADE WITH MURAL PAINTINGS ABOVE. THE ROOF IS AN OVERHANGING GARDEN. IN THE LOWER ILLUSTRATION IS THE INTERIOR OF EXHIBITION HALL, FITTED UP AS A ROMAN GARDEN WITH AN IMMENSE PERGOLA 20 FEET WIDE, EXTENDING AROUND THE ENTIRE HALL

LEFT AISLE ON MAIN FLOOR WITH MITCHELL, HUDSON, LOCOMOBILE AND WINTON ON LEFT SIDE

have been impossible in other years, but the solution was satisfactorily solved this year, thanks to the energy of General Manager Alfred Reeves and his able show committee, headed by Colonel George Pope, and with Colonel Charles Clifton and Secretary Merle L. Downs. Thanks to the energy of this committee, the garden exhibit space has been increased from 70,000 square feet of a year ago to 100,000 square feet today. This enlargement has been brought about by a steel-work construction in which the two balconies have been carried out over the main floor, there being in all 30,000 square feet of floor space added in this way, or more space than was available on the entire main floor of the building.

The garden is a three-floor building, with the second and third floors in the form of huge balconies extending entirely around the building. The lower floor is exclusively devoted to cars, there being but one oval-shaped aisle encircling the floor, leaving an oval space in the middle and an outer space fringing the wall which is used for exhibits. The first balcony is divided circumferentially by an aisle, on one side of which are car exhibits overlooking the main floor and on the inside are accessory exhibits. The second gallery or balcony is divided off the same way, giving ample room for some of the exhibitors to show as high as six cars in a space. Two immense electric elevators were installed to elevate the cars onto these balconies, the obsolete block and tackle method of a year ago having been dropped. It required but a part of Saturday to get all of the cars into position.

But Madison garden affords more exhibit space in the form of another large room known as exhibition hall, and to the right of the main entrance, so that it is reached before the main auditorium. In this space are six concerns—Mercedes, Mercer, Moon, Amplex, Marmon and Corbin. Above this hall is a similar room known as concert hall, in which accessories are displayed.

Naturally the main floor of the garden is

White and Corbin Cars on Display

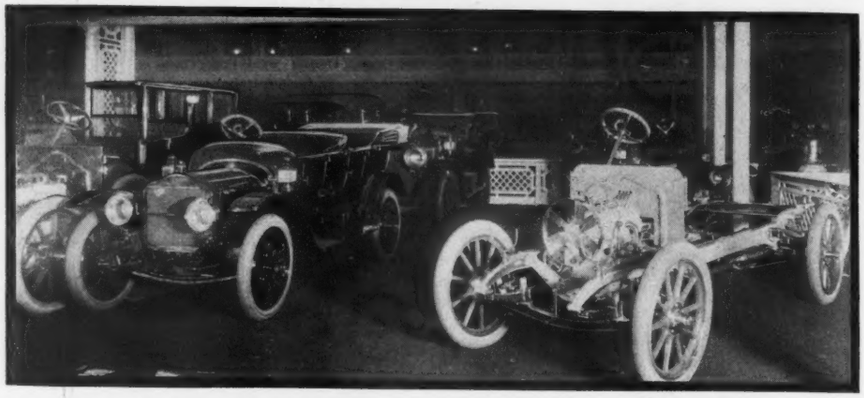
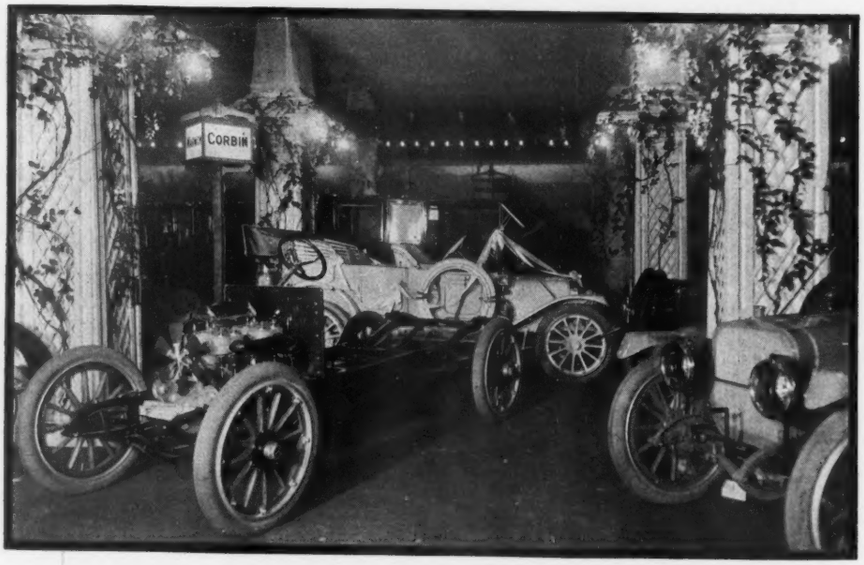
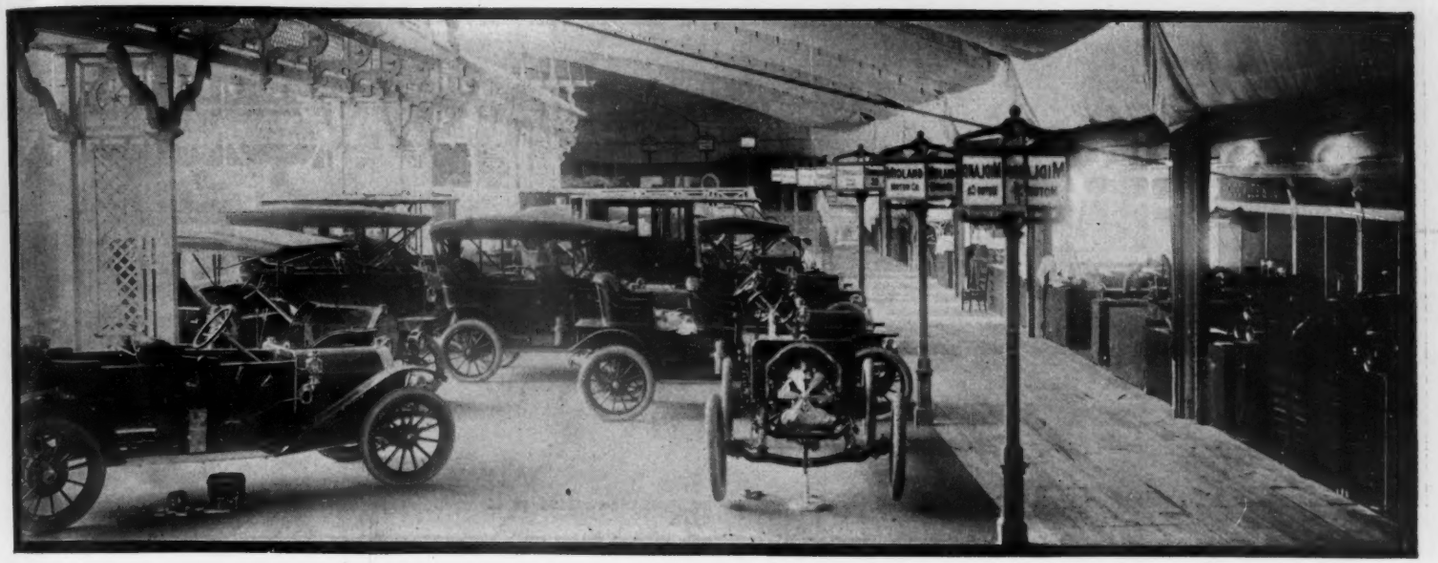


EXHIBIT OF WHITE GASOLINE AND STEAM CARS, WHICH IS ADVANTAGEOUSLY LOCATED IN FRONT BALCONY OF THE GARDEN

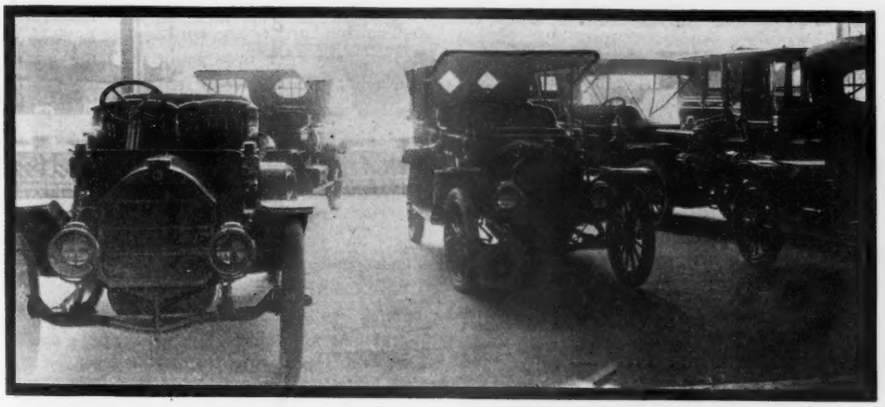


THE CORBIN EXHIBIT IN EXHIBITION HALL CONTAINS A TOURING CAR FINISHED IN WHITE THAT IS ATTRACTING ATTENTION



SECOND BALCONY ON LEFT SIDE, ON WHICH CARS NEVER WERE SHOWN BEFORE

Stands of Stoddard-Dayton and Marmon



STODDARD-DAYTON CARS ARE LOCATED ON THE FIRST BALCONY—MANY TYPES ARE EXHIBITED IN THIS STAND

MARMON SPACE IN EXHIBITION HALL CONTAINS TROPHIES WON BY THP HOOSIER CONCERN ON SPEEDWAY AND ROAD

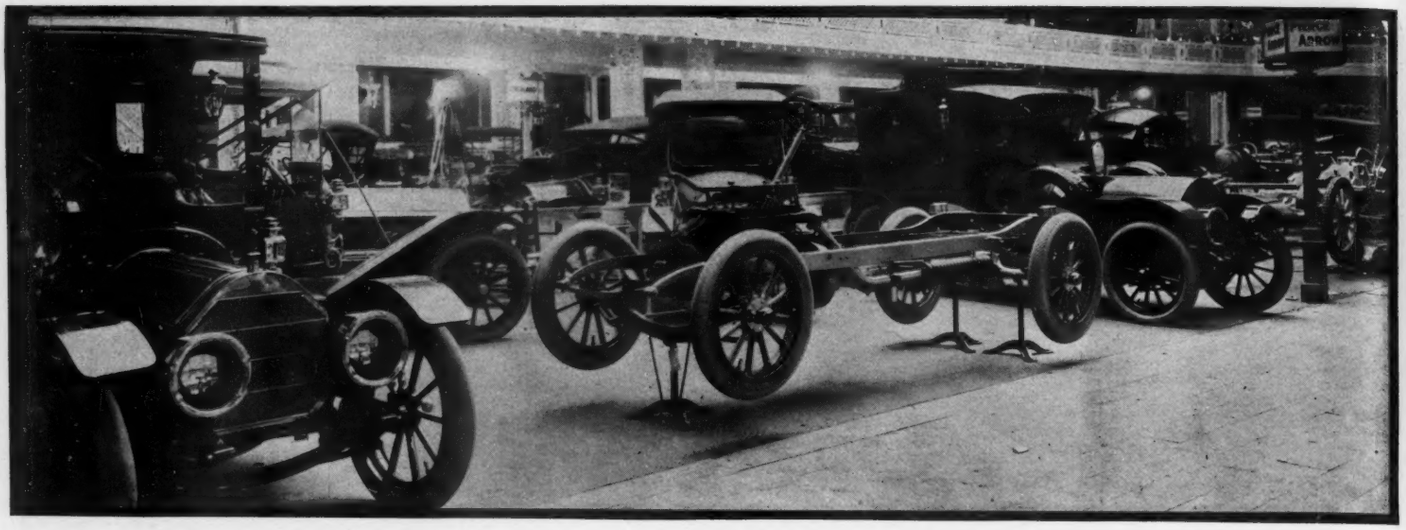
the real show place and in it are not a few of the oldest firms of the association. In the center oval the cars exhibited are, around the outer edge: Stearns, Thomas, Oldsmobile, Franklin, Stoddard-Dayton, Oakland, Lozier, Elmore, Winton, Locomobile, Hudson, Mitchell and Stevens-Duryea. In the center oval are Packard, Buick, Cadillac, Overland, Reo, Peerless, Pierce-Arrow, Chalmers, Maxwell and E-M-F.

In all there are 101 cars and seventeen chassis shown on this floor, all of the concerns excepting the Packard, Thomas, Oldsmobile, Stoddard and E-M-F exhibiting polished or enameled chassis in addition to their touring cars. The Chalmers company leads in the chassis line with two, one of the 30 and the other of the 40.

On the first balcony the car exhibitors have as large exhibit spaces as on the ground floor and the class of cars shown is the same; in fact there has not been any discrimination. There are seventy-one cars and seventeen chassis shown on this balcony, the only concerns not to show chassis being the Knox, National, Pullman and Columbia. On this gallery are White, Garford, Alco, Columbia, Autocar, Everitt, Royal Tourist, Haynes, Hotchkiss, Brush, Sampson, Jackson, Pope-Hartford, Pullman, Premier, Moline, Lambert, Selden, National, Matheson, American and Knox.

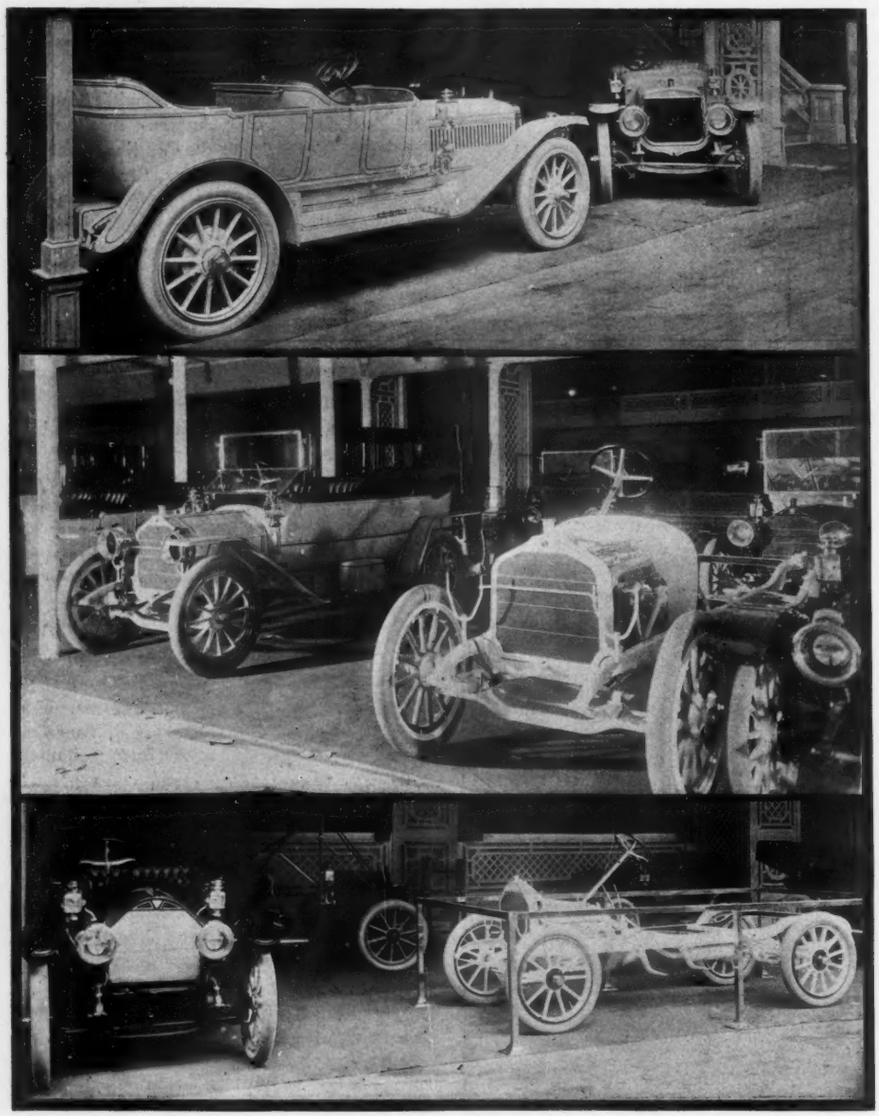
On the second balcony there are fifty-six cars and fifteen chassis exhibited, but two exhibitors, MacIntyre and Stoddard 20 not showing chassis. The cars exhibited are the Cartercar, Atlas, Simplex, Stoddard 20, Midland, Case, Rainier, MacIntyre, Regal, Speedwell, Chadwick, Hupmobile, Kisselkar, Palmer, Singer, Ohio and Inter-State. The largest exhibit is the Inter-State, with six cars and one chassis. The show management has placed illumined glass signs at the foot of the different staircases leading to the galleries, these signs carrying the names of the different cars exhibited.

Of course the show cars predominate on the main floor. The show car is best defined as something out of the ordinary, either by



STAND OF THE PIERCE-ARROW COMPANY ON MAIN FLOOR IS FEATURED BY A POLISHED CHASSIS

Winton, Selden and Hudson Exhibits



ON THE WINTON STAND IS A FOUR-PASSENGER CAR OF HANDSOME DESIGN
SELDEN CAR OCCUPIES A PROMINENT PLACE IN THE SHOW
HUDSON SHOWS A POLISHED CHASSIS THAT ATTRACTS MUCH ATTENTION

way of body design or interior finish. A year ago the milk-white car, with its white leather upholstery, its broad gold stripes and its swathing yards of ribbons was an eye-opener, and today, although the original glamor has ceased to a great extent, the public invariably stops to bestow glances on the latest creation of the body makers' art.

The Packard space contains a novelty in a four-passenger brougham, with a door on the right for the rear seat and a door on the left front for the driver. The left front seat has a swinging back to allow of stepping over the seat into the rear compartment. The interior finish is in cloth and the exterior French gray panels with black body parts and running gear. A coupe in red and black also attracts attention.

The Thomas torpedo in white enamel with French gray striping is attractive. All metal parts, including lamps, are given a silver frosting finish, which resembles aluminum.

One Franklin seven-passenger car, fore-door style, is in red with black stripes. It has screen ventilators in the front of the dash and enclosed electric dash lamps, of which only the round glass resembling a small window in the dash can be seen.

The Stoddard-Dayton Pullman is a four-passenger body of unique design. It has but one door and that is at the left front. The enclosed body embraces the front and rear seats, with but two large windows on each side, and these windows are without wood sashes, the glass ending abruptly where it enters the body wall. Entrance to the rear seats is by tilting the left front seat.

The Pierce-Arrow attraction is the old-fashioned coach for touring purposes. It is a somber dark green built on the landaulet style with a leather hood for the driver. The rear compartment is fitted with toilet and other facilities. As the door is opened a folding step is dropped into place. A decorative feature is the narrow panel on each door immediately beneath the glass. This is filled with a landscape scene in bright colors.

The little old colonial coach on the

STEVENS-DURYEA COMPANY ALSO SHOWS A POLISHED CHASSIS ALONG WITH ITS NEW MODELS

Chalmers 30 attracts many. It is exteriorly finished in yellow with black stripes and red fenders. The interior upholstery is tan with a natural wood finish throughout except the cushions. Four small glass panels are in each window, in the door as well, and the sides, back and front of the body.

The Stevens-Duryea has a handsomely finished fore-door limousine finished in ultra-marine blue with inner trimmings to match.

In exhibition hall the cream Corbin with broad gold stripes and tied up in white ribbons is conspicuous. The leather upholstery is covered with white cloth slips.

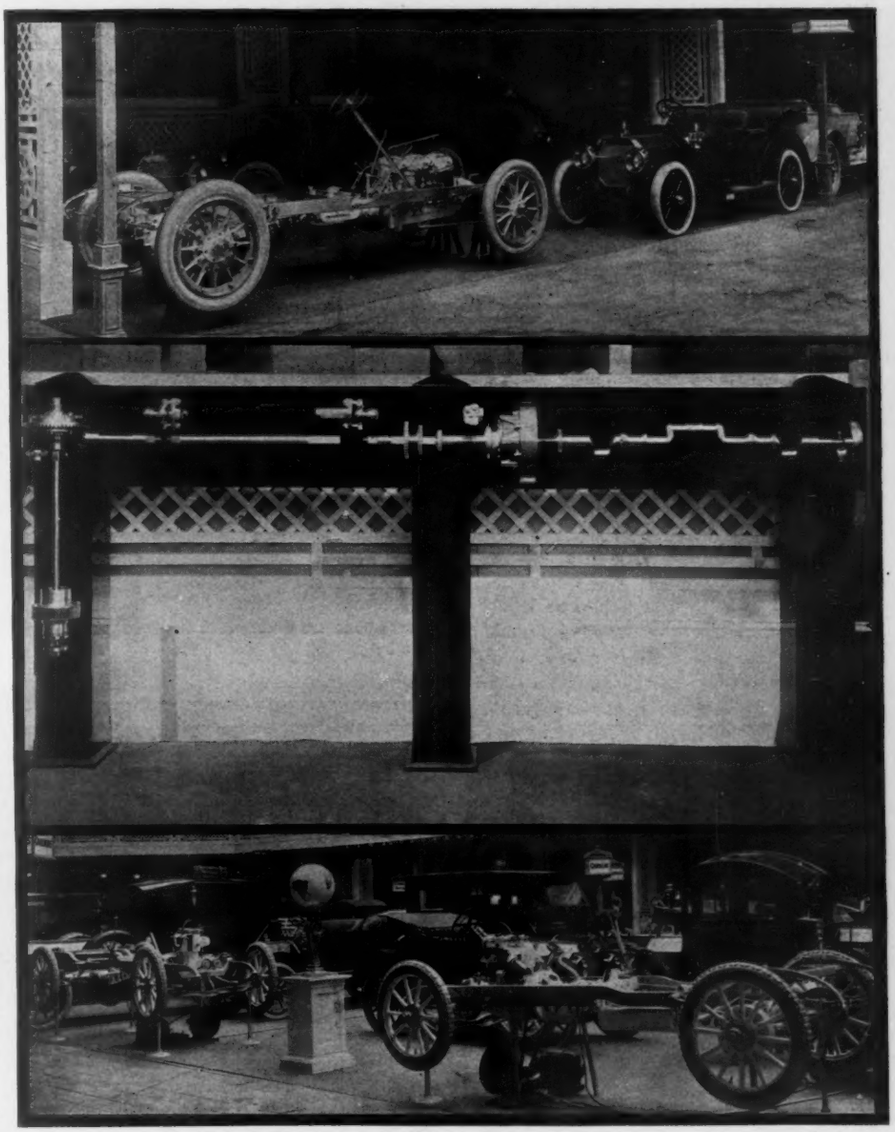
The exhibition hall contains two other show bodies, one the Moon colonial coach or coupe type, with its conspicuously curved top. It is finished in French grey with hair-line blue striping and black lamps.

The other is the two-cycle Amplex finished in cream with broad gold stripes. It is an open touring car with mottled leather upholstery.

In the balconies of Madison garden proper are some conspicuous body types. The Knox fore-door limousine is noted; so is the fore-door Premier touring car, finished throughout in red, with hair-line gold stripes; and so is the canary-yellow Speedwell three-passenger runabout, the body of which ends V shaped back of the rumble seat, and the front seats are separated to allow the third passenger access to the back seat. The car has the steering wheel on the left, but the emergency and change speed levers in the center and operated by the left hand.

In glancing over all the exhibits one cannot but be struck with the phenomenal progress of the last 2 or 3 years in the matter of body style. Last year scarcely a fore-door body was seen, today every exhibit space has one or two and many of the companies are not exhibiting anything else. Three years ago the displaying of a

Locomobile, Stevens and Chalmers



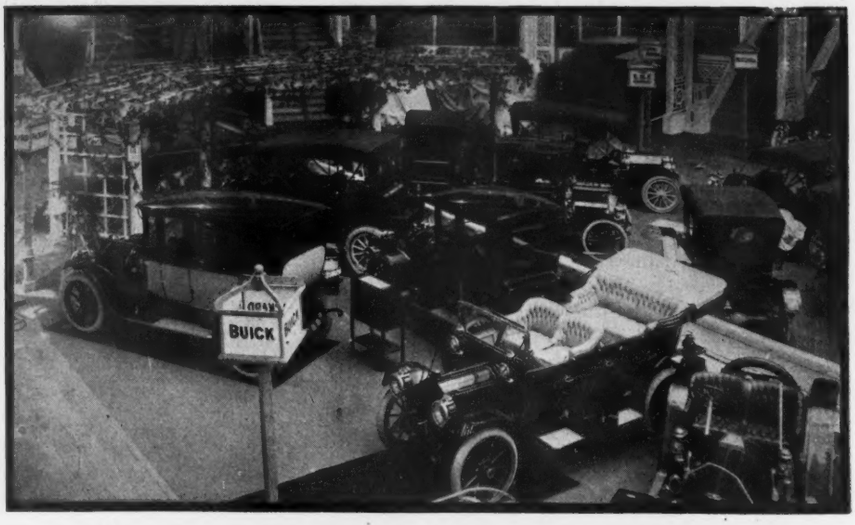
VIEW OF THE LOCOMOBILE EXHIBIT IN THE GARDEN.
STEVENS-DURYEA HAS NOVELTY IN THE WAY OF A CRANKSHAFT EXHIBIT
FULL LINE OF CHALMERS CARS IS ON VIEW IN BIG BUILDING

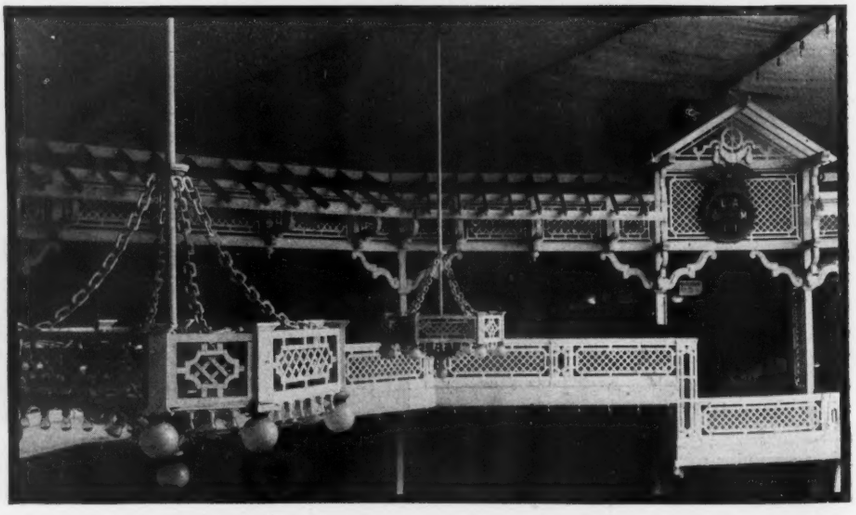
FROM OVERLAND CORNER, WITH CADILLAC AT LEFT AND PIERCE-ARROW, CHALMERS, MAXWELL AND E-M-F IN CENTER

chassis was the exception, today it is the exception not to have one in the show space. The limousine and coupe were found only in the stand of the high-priced builder, but today they are in the majority of the stands. Then there were many so-called body designs that the aristocrat would not select under any consideration, but today the $1,000 car has as attractive a body as the big machines. The body art has been revolutionized.

The leading details of chassis trend were amply outlined in these columns a week ago and nothing need be said along that line beyond a few general conclusions on design and workmanship. The prominence of the six-cylinder car cannot be overlooked, it is coming slowly but with a spirit of permanency; the two-cycle is represented by such firm names as Elmore, Amplex and Atlas; the dropped frame is met with in practically every booth; springs are wider and longer in many cases; rear axles have been improved by the use of heavier housings, many of which are using the forged or stamped parts. The status of the valve-in-the-head motor has not altered, that is the concerns using it a year ago have continued it.

The entire scheme of decoration in the garden this year is superior to previous attempts, there being no effort at the gaudy or frivolous, but all fairly bristles with common sense. Even the exhibit signs are box-like glass cases about 18 inches to the side, with the glass frosted, the car name on all four sides and an electric light inside which makes the latter

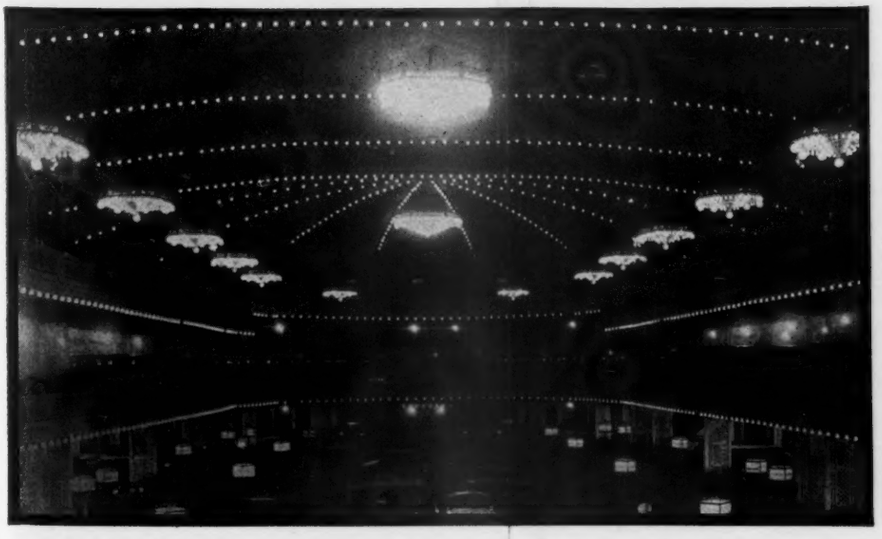




PACKARD DISPLAY AS USUAL IS ONE OF MOST PROMINENT IN SHOW

DECORATIONS ARE MOST UNIQUE AND OF SUBSTANTIAL NATURE

FROM REO CORNER, SHOWING OVERLAND JUST BEYOND, WITH PEERLESS IN THE RIGHT FOREGROUND



MOON CHASSIS AND THE COACH BODY IN BACKGROUND
AS THE GARDEN LOOKED WITH ALL THE LIGHTS TURNED ON

distinct from one end of the hall to the other. The terraced garden effect of the interior is secondary to the car exhibit. Heretofore the associations have interfered with the main object of the show, namely, exhibiting machines. In the exhibition hall a pleasing effect has been produced by covering the walls by color scenes showing the Roma ncoast line, with mountain roads and castles, which carries out very well the general scheme of the Roman garden used as the decorations.

Coming down to the real business of the show, it is too early to even predict what it will be. Many of the sales managers present said the situation was about the same as a year ago so far as retail sales are concerned. There were Saturnay night only the usual first night sales heard from in a few places, but the maker now realizes that many people come to shows to examine and who may not buy until a month or so later. This is the first Madison garden show in which the commercial car and the electric pleasure car have not been exhibited. There are no commercial cars because they will be shown next week, and the electric manufacturers were given the chance of coming in with the commercial car men, but they all gracefully declined, preferring to wait until the Coliseum show at Chicago, where they will have an opportunity of exhibiting alongside the gasoline pleasure cars. There is not a single motor cycle shown this year, the entire exhibit space not occupied by cars being given over to the accessory people, who have utilized every foot of it.

Accessories Makers Much In Evidence

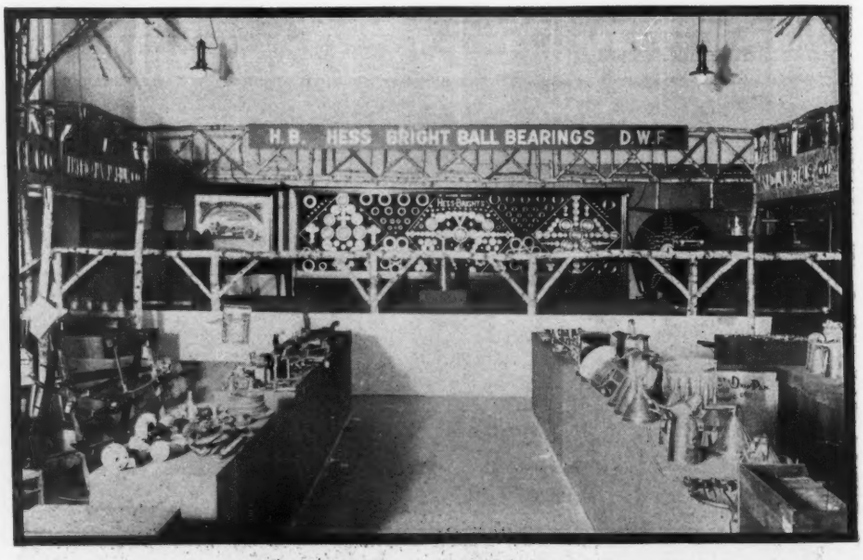
APPEARANCE OF THE EXHIBITION HALL IN MADISON SQUARE GARDEN, WHERE ACCESSORIES ARE BEING SHOWN

Electric People Show Magnetos and Coils in Action, While Spectators Have Chance to Test the Shock Absorbers—Makers of Speedometers Also Demonstrate Instruments

NEVER before in the history of motor car shows in Madison Square garden has the accessory manufacturer been given such a favorable opportunity to exhibit his wares. The amount of space has been increased enormously compared with former years, and it is much more accessible. The show management has erected signs at the foot of all staircases leading to accessory exhibits and at the main entrance and at other points throughout the garden are uniformed attendants, with programs in hand, whose duty it is to tell visitors where part exhibits are located.

Many in Two Balconies

Roughly speaking, the accessory exhibits are in their different places, namely, along the wall on the two balconies in the garden, where they are just across the aisles from car exhibits, occupying the entire basement of the garden, and occupying the entire Concert hall, which is directly above Exhibition hall, located in the right front corner of the building. The members of the motor accessories association occupy the entire space on the first and second balconies, which are the pick of the lot. Throughout the rest of the space there has not been any attempt to segregate the exhibits. There is the usual activity shown in the many spaces, such as demonstration features. The electric people have their magnetos and coils in constant operation, the sparks jumping in the spark plugs, all holding the crowds around the spaces, everyone showing great interest. Shock absorber exhibitors are among the best demonstrators and this year Truffault-Hartford, Flentje, Foster and Westen are seen. Nearly all of the speedometer exhibitors show their instruments in operation. Stewart & Clark have a big display; the Warner display is a neat one with all the instruments mounted on a heavy mahogany table; the Jones instruments are shown on a special stand and the Cleveland and other types are



COMPREHENSIVE DISPLAY OF HESS-BRIGHT BALL BEARINGS

Demonstration of Goods a Specialty

WOODSY EFFECT SECURED IN ACCESSORIES DISPLAY IN EXHIBITION HALL

Every Convenience Offered in the Garden for Display of Sundries — Attendants Point out Location of Various Booths and in Consequence the Stands Are Crowded

equally well displayed in the big garden.

More attention than ever is given over to carbureter displays, some of which are full of interest. The Stromberg display centers around an immense revolving wood pyramid on the top of which is a huge carburetor nearly 2 feet high. It is a perfect one in every respect. On each side of the pyramid are the different models and their parts. The Schebler stand has as its magnet a heart in the center of which are suspended the five models listed for the coming season. The Kingston company is in its usual place. The Holley jet is shown. Among the new carbureters are the Vortex of Chicago, the Rayfield of the same city, the Diezeman, the Stewart, the Polyrhoe, the Bowers and the Fletcher.

The constructive features of each is dealt with on other pages of this issue, in an article dealing exclusively with the carbureter situation.

There has been a vast amount of improvement carried out in the carbureter field by improving the old models and bringing out new ones. The shutter valve in the primary air pipe for starting is used on nearly all models. The hot-water jacket has gained and there is only one type in which the venturi mixing chamber or strangling tube is not used. Only one example is shown of the springless type, the majority of them using spring as a means of control on the auxiliary air valve. Some use two springs for this valve and some claim the same results with but one cone-shaped spring.

OPERATION OF BOSCH MAGNETOS A FEATURE OF DISPLAY

Many Magnetos Shown

The magneto field shows immense gains in numbers, several new concerns now showing, the old makers, such as Bosch, U. & H., Remy, Splitdorf, K. W., Heinze, Connecticut, National, Eisemann, Pittsfield, Herz, Briggs and Simms being on hand. Some of these concerns are showing their instruments for the first time.

TOP GALLERY AT THE MADISON AVENUE END, SHOWING ACCESSORY EXHIBITS

The U. & H. line, shown by the J. S. Bretz Co., is complete. The Bosch people are featuring their new double-spark instrument, which gives two sparks simultaneously and permits of using two sets of plugs with but one magneto. The instrument has the secondary winding of the armature connected up slightly different and two distributors are used, there being eight high-tension plugs.

SPLITDORF MAGNETO DISPLAY

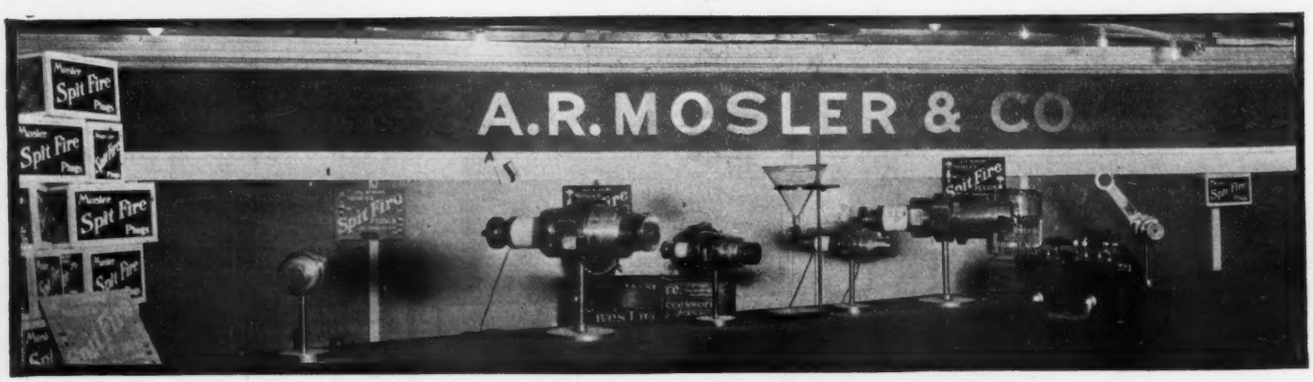
The National low-tension magneto has been improved by using a mica window over the distributor and marking arrows on this showing the points at which the different cylinders should be ignited, which facilitates timing. The instrument also has been improved so that the platinum points in the breaker-box can be adjusted without stopping the instrument.

The Connecticut is showing its new instrument. It is in two types, the independent or single and the dual, the latter working with a battery so that one set of plugs serves for the magneto and battery. The magneto is a low-tension type with but a single winding on the armature, the cylindrical transformer coil is, however, a part of the instrument in that it is threaded into it instead of being carried on the dash of the car.

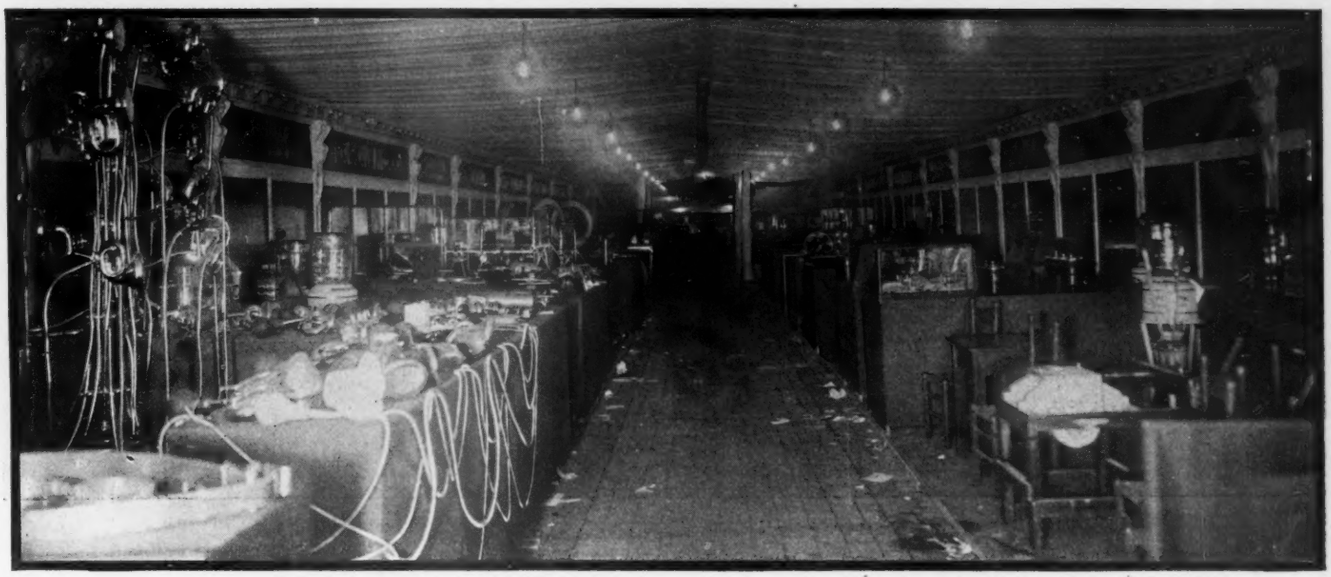
The Heinze low-tension magneto is shown. It uses the round cross section magnet instead of the rectangular. The armature is carried on annular ball bearings, each bearing having a carrying capacity of 3 pounds. One of the Eisemann magneto features is the automatic device for advancing the spark. This is done by a pair of governor weights attached at one end to a sleeve through which extends the armature shaft and hinged at the other end to the armature. In the armature shaft are two heilicodial ridges which engage with similarly shaped splines on the sleeve. When the governor weights begin to spread the sleeve changes the relative position of the armature and the pole pieces. The spreading of the wieghts rotates the armature forward. In the Simms magneto a starter is incorporated. The Remy magneto continues using a stationary winding, the armature being a revolving shaft carrying two L-shaped steel forgings. The coil surrounds the shaft between these forgings. A separate transformer coil is used. The company has a complete line of kick switches.

The K.-W. Ignition Co. shows its new high-tension instrument, which is specially adapted for racing cars and aeroplanes. The company also shows its regular line of low and high-tension magnetos.

The Pittsfield high-tension magneto for this year has been made water and dust proof. Marburg Brothers show the Mea suitable for one, two, three, four, six and eight-cylinder motors. This instrument uses bell-shaped magnets in place of the



MOSLER COMPANY ILLUSTRATES OPERATION OF ITS SPARK PLUGS ON A BIG SCALE



DISPLAY OF ACCESSORIES IN THE BASEMENT OF THE GARDEN

horseshoe type. On the Herz the magneto windings on the armature as well as the condenser have been improved.

Looking all through the magneto field it is most apparent that there has been a lot of cleaning up done. The lubricator has been looked after where plain bearings are used. A more waterproof construction is seen on every hand and much care has been given to the distributor and breaker-box construction. Two concerns have provided means for cleaning the carbon points without taking off the breaker-box cover and one has furnished a special means of adjusting these points while the engine is running. There is a commendable change in the quick demountability of the breaker-box and distributor covers.

A vast amount of enterprise is displayed in the design of wind-shield, nearly all of which are of the folding and zigzag type. The brass frame is seen everywhere, there scarcely being a wooden one exhibited. The automatic method of locking the upper half in different positions is still gaining, but positive locks are being used. Designs in which the lower half can be tilted as well as the upper half are increasing. The Troy automatic shield uses two case-hardened steel disks, which disks are tongued and grooved and held together by a crucible steel spring. The tongues and grooves are distributed to give the upper half the desired angles.

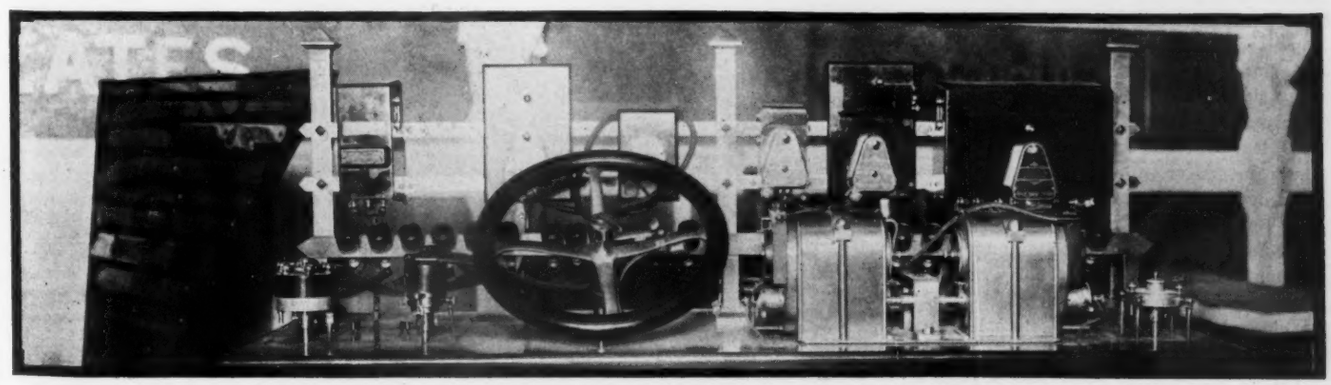
The Metal Stamping Co. shows one automatic type in which the upper half can be locked in a great many positions. One-half of the hinged is a circular socket with a series of circumferential holes in its periphery; the other part of the hinge is a cross to work within the socket. The ends of the four arms of the cross carry balls pushed outward by small springs.

The Sprague Umbrella Co. shows its new combination shield. The Sprauge automatic lock consists of two opposing disks, one with grooves cut diametrically and the other with diametrical tongues. The disks are held together by springs. When locked the tongues rest in the grooves.

The Vanguard concern has a new ball-bearing type of shield. It can be carried vertically in a zigzag or in a horizontal position over the hood, the entire hinge is but ⅛-inch thick and is carried in a weatherproof brass cap. The Newark Rivet Works has improved its three 1910 types of shields. The folding automatic types are made so that the upper half may be placed in any position in a three-quarter circle with one hand while the car is in motion.

What is known as the windshield deflector is an improvement along this line. In conjunction with windshields should be noted the new devices for rubbing off snow, rain or sleet that fogs the glass. The Gabriel Horn Co. has a cleaner which is hinged to the top of the shield.

SCHEBLER CARBURETER DISPLAY



CONNECTICUT'S DISPLAY OF IGNITION DEVICES AND STEERING WHEELS COMPREHENSIVE ONE

FRONT END OF FIRST BALCONY IN GARDEN—COMPREHENSIVE VIEW OF ACCESSORIES DISPLAY

Independent Makers' Organization

NEW YORK, Jan. 10—There was formed at the Manhattan hotel here today the Automobile Manufacturers' Association of America, an organization of motor car manufacturers who have not been in the licensed association and many of whom exhibited at the recent Grand Central palace show, held in this city last week. The association has been organized along mutual benefit lines. The education of the car dealer throughout the country to the fact that he can handle any make of car he desires being one of the aims of the association. The association has secured its charter and with the election today the following officers were elected: President, T. A. Campbell of the Imperial Auto Co., Jackson, Mich.; first vice-president, W. S. Jones, Otto Gas Engine Co.; second vice-president, Carl F. Johnson of the Johnson Service Co., Milwaukee, Wis.; secretary, C. W. Kelsey of the C. W. Kelsey Mfg. Co., Hartford, Conn.; treasurer, W. J. Mills of the H. H. Babcock Mfg. Co., Watertown, N. Y.; H. Longendyke, Troy, N. Y., has been appointed general manager of the association.

Although nothing definite has been given out on the membership it is understood that between thirty and forty car manufacturing concerns have signified their intention of joining the organization. The membership, according to the constitution, is divided into two classes, active and associate. An active member is the representative of an individual, firm or corporation engaged in the manufacture of motor vehicles; whereas an associate member is the representative of an individual, concern or corporation engaged in the accessory business. The membership is open to all concerns of good standing engaged in the motor car or accessory business.

It is understood that members are to be elected by vote of the executive committee. The charter membership is still open. The meeting with which this organization was effected was a most interesting one, beginning as it did at 11 o'clock and not finishing until after 5 this evening. The headquarters will be located in this city, but the exact location has not as yet been decided upon.

READY FOR MILWAUKEE SHOW

Milwaukee, Wis., Jan. 9—The third annual Milwaukee motor show will open in the Auditorium next Saturday evening, at 8 o'clock. Forty distinct makes of passenger vehicles and fourteen commercial cars will be included in the big display, which will eclipse that of 1909, held under the auspices of the Milwaukee Automobile Club. This year, the Milwaukee Automobile Dealers' Association is giving the exposition. In addition to occupying the entire arena, seating 8,000, the displays of cars, parts, accessories, etc., will fill Kilbourn and Juneau halls, seating 1,500 each, and Rehearsal hall, with 1,000 capacity. The grand lobbies will also be used as exhibit space. The entire basement will be devoted to commercial car exhibits. The show will be open daily from 10 a. m. to 10:30 p. m., and will close on Friday night, January 20. The active management is in the hands of a committee headed by Frank J. Edwards, manager of the KisselKar Co. of Milwaukee, assisted by Bart J. Ruddle.

ONE SHOW FOR CLEVELAND

Cleveland, O., Jan. 7—Cleveland will have only one show for the 1911 season instead of the two that had been planned. All differences that have existed between the local dealers and manufacturers have been brushed aside and an agreement has been reached whereby only the one show will be held. February 18 to 25 will be the probable dates of the show, which will without doubt, under the circumstances, be the biggest show that this city has seen. Not only will there be more cars, both large and small, and accessories exhibited, but the decoration of Central armory will be more beautiful than ever before. Many of the manufacturers and dealers were opposed to the holding of two shows, and Fred Wood, manager of the Olds-Oakland Co., called a meeting last week to solve the problem. Fifty dealers of both factions were present and there was a unanimous sentiment expressed for one big show. A committee consisting of

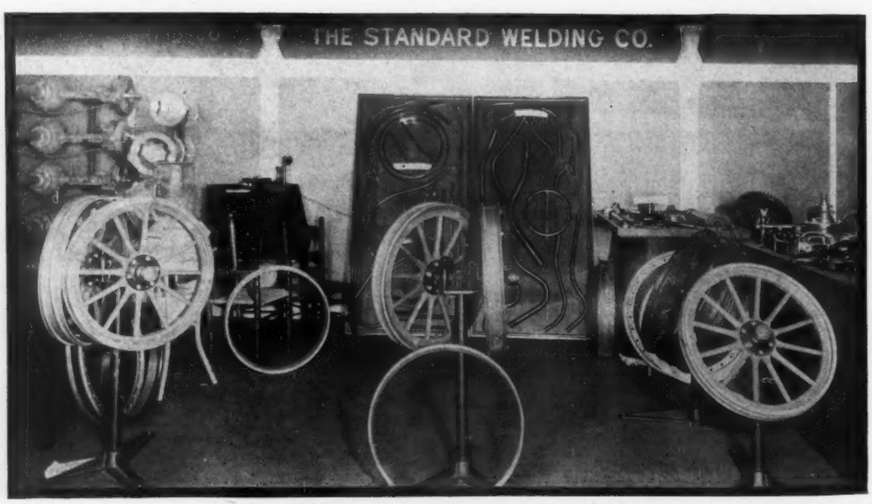


EXHIBIT OF STANDARD WELDING CO. IN A. L. A. M. SHOW

MADISON SQUARE GARDEN SHOW—ACCESSORIES AND CARS IN THE FIRST BALCONY

Fred Wood, Fred H. White of the Baker Motor Vehicle Co., George H. Kelley of the Standard Automobile Co., C. G. Bleasdale of the United Motor Cleveland Co., and C. M. Rockwell of the Franklin branch, prepared the plans for the combination.

ST. PAUL SHOW OPENS

Minneapolis, Minn., Jan. 10—St. Paul's first show, which will last 5 days, opened this afternoon at the Auditorium. The real show started in the evening, when Governor Eberhart, Mayor Keller, and distinguished state and city officials were the guests of honor. Among the visitors who it is known will attend the show are many salesmen who have been called in by Twin City distributers from territory controlled by local markets. This includes ten states. One hundred and fifty cars, every one of which is a 1911 model, ranging in price from $500 to $8,000, including many electric cars and commercial trucks, are shown. The exhibitors are St. Paul dealers in co-operation with thirteen firms in Minneapolis.

This is the first effort of St. Paul in the show line and the support it has received is most encouraging to the tradesmen.

The Show Outlook In Philadelphia

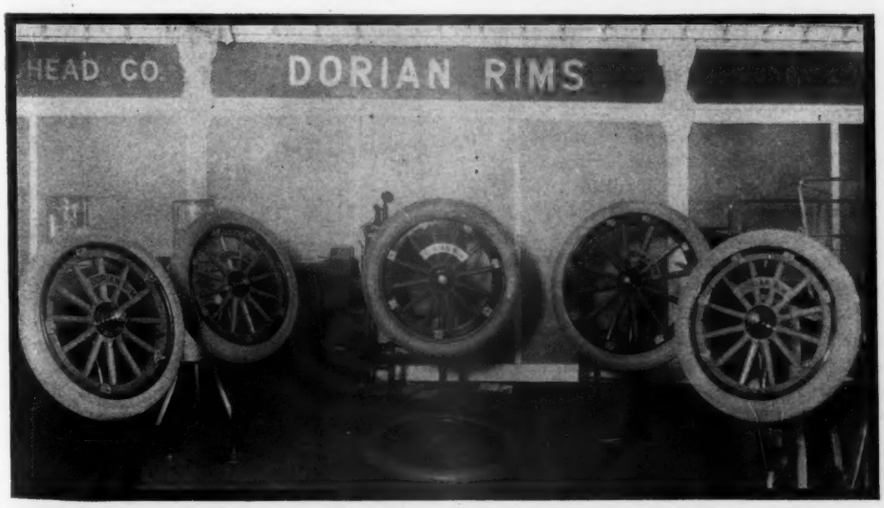
PHILADELPHIA, Pa., Jan. 8—Next Saturday will inaugurate what is promoters have every reason to believe will be the most successful show from every viewpoint ever held in Philadelphia—the initial effort of the Philadelphia Automobile Dealers' Association. Being in the nature of an experiment, comprised exclusively of cars manufactured under Selden patents, considerable doubt was expressed at the outset as to the ultimate outcome, but from the day that notice was given that applications would be received for exhibition space the scramble of dealers and agents for choice positions spelled success. Seriously handicapped by lack of room to accommodate all who expressed their intention to have displays, it was early seen that the Third Regiment armory at Broad and Wharton streets, large as it is, would be insufficient, and the First Regiment armory, Grand and Callowhill streets, was secured for a week to hold the overflow. Hence during the first week the show will be conducted simultaneously at both the First and Third Regiment armories, tickets of admittance being in coupon form, entitling the bearer to admission to both buildings.

It is planned to confine the displays in the First Regiment armory exclusively to gasoline pleasure cars. Concerts every afternoon will be given by the First Regiment band. Unique decorations will be made a feature in this building, they being in the form of a representation of the lobby of a large hotel, making a departure from the time-worn scheme of pennants and bunting solely. Out-of-the-ordinary decorations will also mark the Third Regiment armory, the interior of which will be transformed into a representation of Venice. As was the case last year, the Third Regiment band will dispense music afternoon and evenings, which will be an attraction that will draw the crowds.

Several well-known dealers, notably those whose showrooms are in close proximity to the armories, seizing the opportunity afforded, in addition to having exhibition space in the big tent, will hold miniature shows of their own during show week and will have displays no less attractive than those in the armories, it is declared.

The Hotel Walton on January 24 will be the scene of the third annual banquet of the Quaker City Motor Club and determined efforts are being made to outdo all former occasions. Prominent speakers and guests, including the present governor of Pennsylvania, Edwin S. Stuart, Governor-elect Tener, Mayor Reyburn of Philadelphia and other persons prominent in public and official life will be present at the festive board. This dinner will bring out a crowd of motorists.

With the holding of the Quaker City Motor Club's third annual banquet, the inaugural roadability run to Harrisburg via Reading, Lebanon to Harrisburg and the show all within a radius of a couple of weeks, motor enthusiasts will come into their own, interest at the present time being at a minimum.



STAND WHERE DORIAN RIMS ARE EXHIBITED IN THE GARDEN

Refinements in Many Minor Details

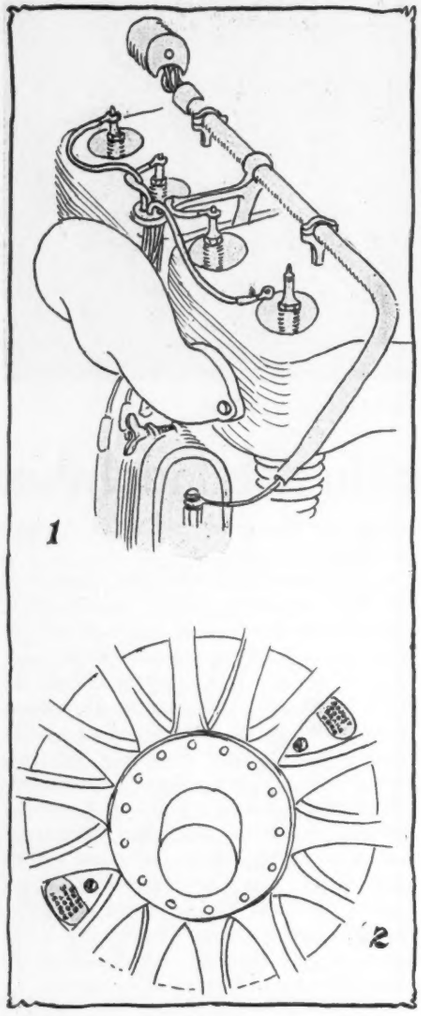


FIG. 1
1—OLDSMOBILE IGNITION WIRING.
2—ROYAL TOURIST'S BRAKE ADJUSTMENTS

DEVELOPMENT, in the way of little things that tend to make motoring a pleasure, is quite remarkable this year, as the accompanying illustrations show. The efforts that have been made by the manufacturers to promote the accessibility of all parts requiring regular lubrication, inspection or adjustment, and the practical arrangement of the accessories necessary to the comfort and convenience of passengers and operator, have brought out many ingenious devices and improvements.

Nowadays, on the majority of cars, instead of indiscriminately hanging the accessories about the car like ornaments on a Christmas tree, they are neatly and conveniently arranged in positions especially designed for them. Adjustments, which formerly required the laborious removal of road wheels, disagreeable crawling under the car, undesirable lifting of floor boards, engine hoods, or lowering of mud pans, are now more advantageously reached and readily made.

Ignition devices and the wires communicating between them, are much more suitably arranged for inspection or adjustment, and thoroughly protected from oil, water and heated portions of the engine.

Heretofore unget-at-able internal mechanisms now are automatically lubricated or provided with convenient means for lubrication; and excellent facilities are provided for replenishing the oil supply and adjusting the bearings. Small inefficient oil caps are replaced by large and more suitable grease cups which are provided with locking devices and covers to prevent their loss or the accumulation of dirt in them. Almost all spring shackle bolts are provided with grease cups of improved design, and more conveniently attached. And crankcase oil lever indicators are more reliable and so situated that they may be more readily seen.

Starting Made Easier

Among other things, much progress has been made in the way of providing devices to facilitate starting of motors in cold weather. Acetylene tanks are successfully hidden from view without requiring the use of excessively long pieces of piping, and arranged in positions where the valves may be conveniently reached. Many improved warning sound devices are to be found among the new equipment and their controlling devices arranged so that they can be brought into use at a moment's notice. A number of new features in foot accelerator design are to be seen which go far toward eliminating the unsteady action of the car when traveling over rough roads, and make driving less strenuous for the operator. Adjustable operating pedals have increased in number and type. Locking devices are provided on the hub caps of many cars. Specially designed and arranged fittings are furnished for the attachment of speedometers. Dash ventilators are provided in torpedo type bodies to increase the comfort of the driver and front seat passenger. Special brackets are furnished for number plates. And inclosures or casings for valve-operating mechanisms are fast growing in popularity.

Protecting the Wiring

In Fig. 1, part 1, an example of simplicity and ample protection for the wires of an ignition system, is illustrated. The magneto is located at the side of the engine so that the distributor is almost opposite the space between the two cylinder castings, and the high-tension cables extend directly upward inside the intake pipe and between the cylinder pairs to a specially designed fiber-insulated bracket from which they are distributed to the spark plugs. Instead of bringing the low-tension wires down between the crankcase of the motor and the frame where they are in the way and their insulation subject to possible damage, they are carried in a simple metal tube located above the cylinders direct to the improved combined switch and coil which protrudes through the dash. The entire wiring system of the motor is practically in plain sight and could be renewed, changed or tested by any amateur of ordinary intelligence.

Oiling Facilitated

In Fig. 2, part 1, is shown the facilities provided by one concern for adjusting and oiling the internal brake-operating mechanisms. There are two holes about an inch in diameter diametrically opposite each other in the side of the brake drum between the spokes. These holes are ordinarily closed by brass plugs which do not rust and which may be removed by means of a screw driver. When the plugs are removed the same screw driver may be employed to adjust the brakes, and the spout of an oil can may be inserted for lubrication. To remind or inform the motorist of the why and wherefore of these plugs there is a little brass sign opposite each one of them which bear the words, "Adjust foot brake here."

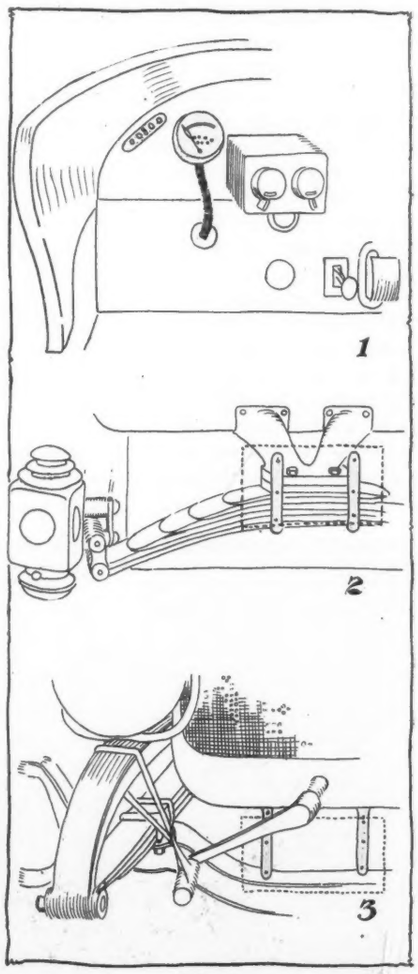


FIG. 2
1—KNOX'S SPEEDOMETER ARRANGEMENT
2—PEERLESS REAR NUMBER-PLATE BRACKET
3—FRONT NUMBER-PLATE BRACKET

Characteristic of the A. L. A. M. Cars

A dash ventilator and a special arrangement for the speedometer of torpedo type body construction, is illustrated in Fig. 2, part 1. There is a little handle in the center of the ventilator which slides in either direction to open or close it. The speedometer instead of being placed directly behind the steering wheel where it would not be plainly visible, and instead of having its cable pass through a hole in the body or fender, it passes down through the foot board over the flywheel and alongside the frame inside the mud pan, which it pierces close to where it is attached to the steering knuckle. The shaft casing is practically out of sight, in a thoroughly protected position, and cannot be injured by dragging along the ground should it become disconnected from the speedometer gears.

Much damage has been done to radiators in the past on account of having tubes cut and cells made to leak by wires used in attaching number plates. There are cases where motorists have been fined for driving their cars without number plates which had been lost because of unsuitable means of attachment. Motors have been damaged through having their cooling efficiency abnormally reduced where large number plates have been placed in front of the radiators so as to prevent large areas to be rendered practically useless. And as the laws require that number plates be placed in a plainly visible location on the car, it is high time that manufacturers are providing facilities for this necessary evil. To start a movement in this direction in Fig. 2, parts 2 and 3, is shown a simple set of brackets provided on the car of a prominent make. They require no description. They speak for themselves.

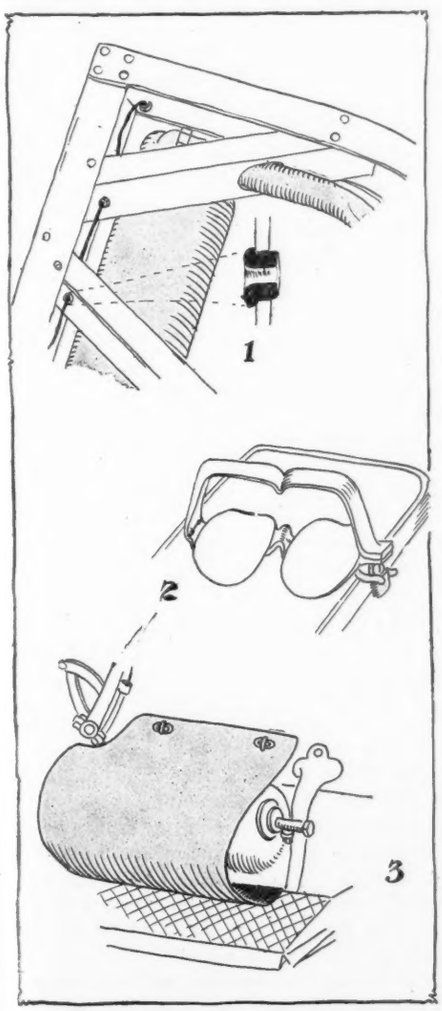


FIG. 3
1—PEERLESS LIGHT WIRE BUSHINGS
2—PEERLESS ANTI-RATTLING LOCK-HOLDER
3—COLUMBIA'S ACETYLENE TANK APRON

Refinements of Details

More refinements in detail of small but important factors of car construction, and efficiency in operation, are shown in Fig. 3. Part 1 shows the rear end of a chassis. The exhaust pipe and muffler of this car are very neatly and substantially arranged, the exhaust pipe passing directly through one of the heavy angular gussets so as not to reduce the spring clearance by passing under it. Another interesting little detail of this illustration is that at each place where the electric wires for the tail light pass through the frame there is a little hard rubber blushing to protect chaffing of the insulation and consequent short circuits. In Fig. 3, part 2, a lockable tire bracket is shown, which is designed to prevent theft of the extra tires. A commendable little detail in connection with this bracket is the provision of two flexible fingers for the purpose of gripping the lock so it will not rattle. A very simple method of concealing the acetylene gas tank of a car is shown in Fig. 3, part 3, the tank occupying the usual regular position and being covered by a patent leather apron, secured at its lower edge to the running board and above to the side member of the frame by means of two cleats. Other commendable methods of removing the acetylene gas tank from sight without rendering its valves or means of attachment inaccessible are shown in Fig. 5, part 1, Fig. 6, part 3, and Fig. 7, part 4.

As for rear springs, rather an interesting example of graceful and substantial spring and bracket construction is shown in Fig. 4, part 1. Instead of simply securing the spring bolt at one end the spring bolt bracket arches over the spring, providing a bearing for each end of the spring pivot bolt.

In the past year or two the valve operating mechanism of a number of L-type motors, including especially the springs, valve stems and push rods, have been inclosed, so as to prolong their life and wearing qualities by eliminating dust and facilitating lubrication. This is a most desirable movement and one that not only adds to the simple appearance of the motor but also facilitates cleaning it. That similar protection is possible on motors with overhead valves is shown in Fig. 4, part 2.

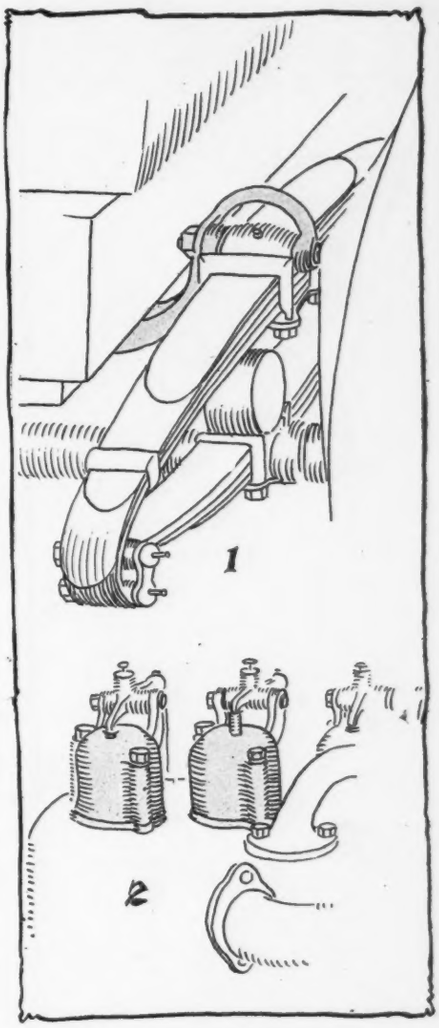


FIG. 4
1—FLANDERS REAR SPRING BRACKET DESIGN
2—POPE-HARTFORD'S VALVE SPRING CASINGS

In Fig. 5 a number of praiseworthy improvements are illustrated. Part 1 shows a running board construction that offers convenient means of carrying the Prest-O-Lite tank and tools of a car. The whole length of the running board comprises a long, shallow case partitioned crosswise in the middle, the forward half being especially adapted for the reception of the Prest-O-Lite tank as indicated, and the rear portion being designed for tools or other small articles. The covers of these cases are hinged along the inside and when closed complete the running board. A metal apron completely incloses the space between the side member of the frame and the running board and doors are provided therein to give access to the oil cups of the spring shackle, and adjustments not

Clever Ideas in Body Equipment

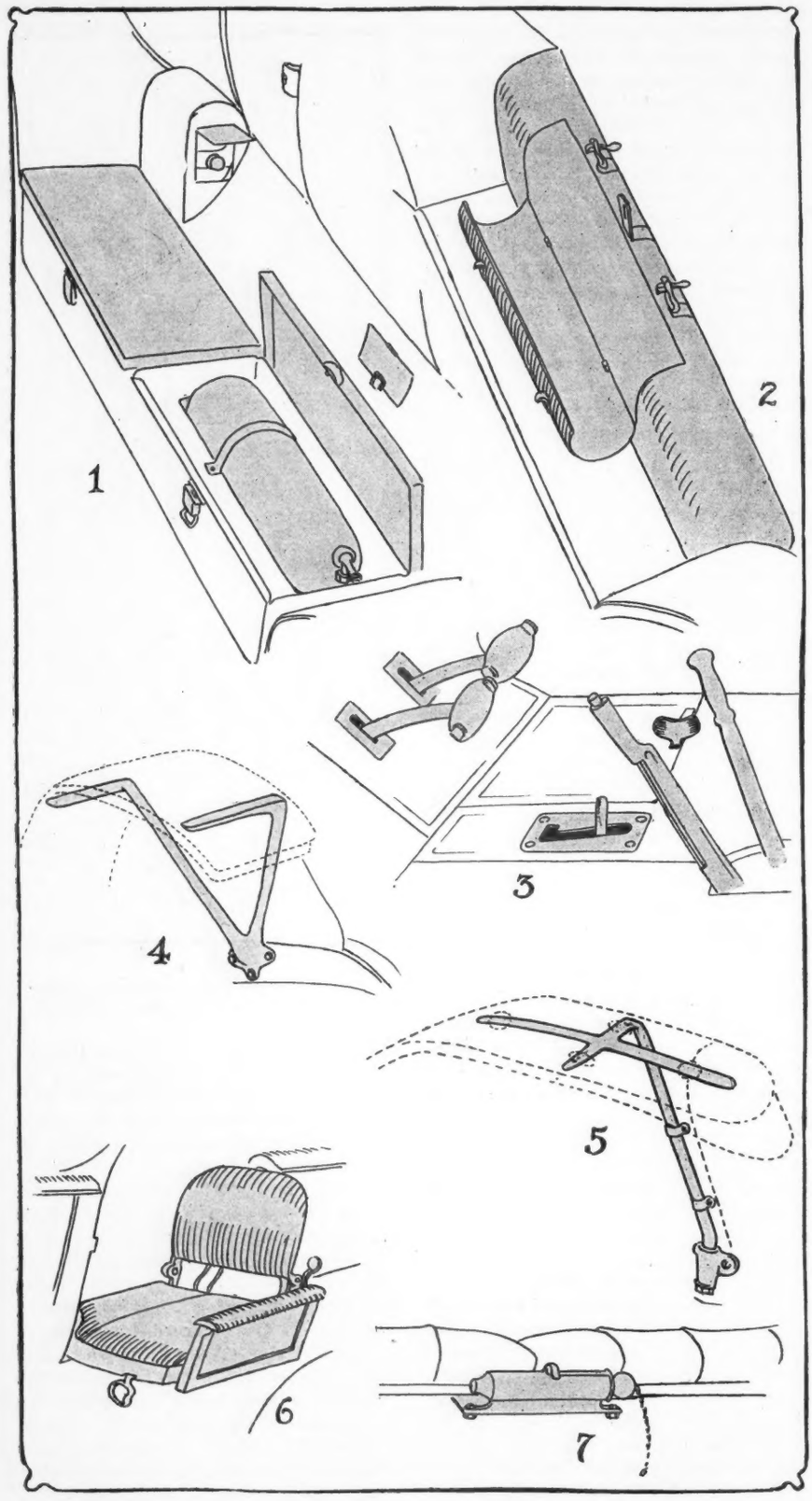


FIG. 5

1—STODDARD-DAYTON RUNNING BOARD FEATURES; 2—COLUMBIA'S MUD-APRON RUNNING-BOARD TOOL-BOX; 3—OVERLAND CONTROL FEATURES; 4—CHALMERS FORGED FENDER BRACKETS; 5—NATIONAL FENDER BRACKET DESIGN; 6—EXTRA FOLDING-SEAT ON LOZIER'S LAKEWOOD MODEL; 7—ELECTRIC CIGAR LIGHTER ON THOMAS CARS WHICH MAKES IT EASY FOR THE MOTORISTS WHO ENJOY SMOKING

otherwise readily accessible. An ingenious method of utilizing the space between the running boards and side members of the frame is shown in part 2. By curving the mud guard outward and boxing in the space on the inside, a very capacious space is provided for carrying tools and the like. A large door conforming to the contour of the mud guard gives access to the compartment and two latches are used to secure it which are of the non-rattling design.

Much Originality Is Shown

Several departures from the conventional means of control design are shown in Fig. 5, part 3. The driver's seat is on the right side of the car, but the control levers are in the center, so as to be operated by the left hand of the driver. The foot accelerator of the carbureter is not a pedal operated by the toe, but consists of a lever mounted to slide transversely in a slot and to be operated by shifting it sidewise with the side of the right foot. The muffler cut-out is quite original in that the cut-out lever also slides in a slot, and is designed to be pushed forward to open the cut-out. A recess is provided at the forward end, to the right, in which the lever may be slipped when the cut-out is to be held open indefinitely. To release the cut-out one has but to kick the lever to the left with the side of the foot so as to free it from the notch and a spring draws it back into place. The clutch and brake pedals of this car are also of good design in that they are broad and provided with lugs so that the foot will not slip off of them, and they operate through holes instead of long slots in the foot boards. The holes are preferred to slots because there is less possibility of oil being thrown up onto the trousers and feet of the operator and the footboards; and the cold drafts often present in the winter time are considerably reduced.

Attention is called by some makers to the stronger and more rigid construction of the fender brackets now being used in their cars. The design shown in parts 4 and 5 being sufficiently strong to permit the passenger to sit on the fenders without danger of their giving way.

In Fig. 5, part 6, an innovation in the way of a folding extra seat is illustrated. There is no door on the left side of the tonneau, but instead a folding seat is provided which has the appearance of a door when not in use. The back rest simply folds down onto the seat portion and a little lever opposite the outer hinge is provided to lock it when in the open or closed position. The main seat portion then folds up so that its under side is flush with the outer panel of the body.

For the benefit of motorists who smoke in Fig. 5, part 7, a small electric cigar lighter is indicated attached to a bracket just behind the top and back of the rear seats. The wires are attached to the lighting or ignition battery and the device consumes current only when in use.

A new and convenient position for a tool

box is shown in Fig. 6, part 1. The box is of fairly generous proportions, of metal construction, and is located under the hood between the side member of the frame and the motor crankcase. A leather strap is provided to secure the cover into place and two flexible clips or clamps are arranged on the cover to receive and securely hold a couple of hand oil cans. One of the cans might be filled with cylinder oil and the other with gasoline for priming purposes. Heretofore electric dome lights in the folding tops of touring cars have been unusual, but now even this is possible and the electric wires can be just as readily concealed as in a limousine body, as shown in Fig. 6, part 2. In Fig. 6, part 4, a means of covering the slot of a tonneau door latch is illustrated. This device is to be found on a number of cars this year. It consists simply of a sliding cover for the slot which is pierced by the handle of the door lock. It covers the slot entirely except when the handle is pushed forward, as illustrated, to disengage the door latch.

In order to give easy access to the clutch mechanism so that it may be oiled, inspected or adjusted, several cars are now providing an opening in the footboard with a readily detachable cover, as illustrated in Fig. 6, part 5. In part 6 of the same illustration a means of supporting the tail light on a rear fender instead of on a bracket attached to the rear end of the frame or body is shown. This forms a most accessible and practicable support for the lamp. Part 7 shows a combination tool and battery box. It is mounted on the running board of the car in a conventional manner, but instead of leaving a space beside the battery in a large box, the battery completely occupies a certain portion and the rest is partitioned off to form a separate compartment for tools and other small articles that are most often needed. The cover of the tool compartment is shown in an open position and to open the battery compartment one has but to loosen the two latches inside of the tool compartment which secure the main cover. Mud aprons extending out at the bottom of the radiator between the front ends of the side members of the frame are growing in popularity, as illustrated in part 8. These aprons prevent mud from being splashed up into the air tubes of the radiator from the road and eliminates overheating of the motor from this cause.

Engine Starting Facilitated

A number of constructional details are shown in Fig. 7. Part 1 is a means adapted by one concern to facilitate starting of the motor.

To prime the motor the operator simply opens the valve by means of a little lever, then takes hold of the handle on the pump rod, pulls it forward to draw a charge of gasoline from the float chamber of the carbureter into the pump, then as he forces it backward, the charge is forced into the mixing chamber and intake

Some New Things for the New Year

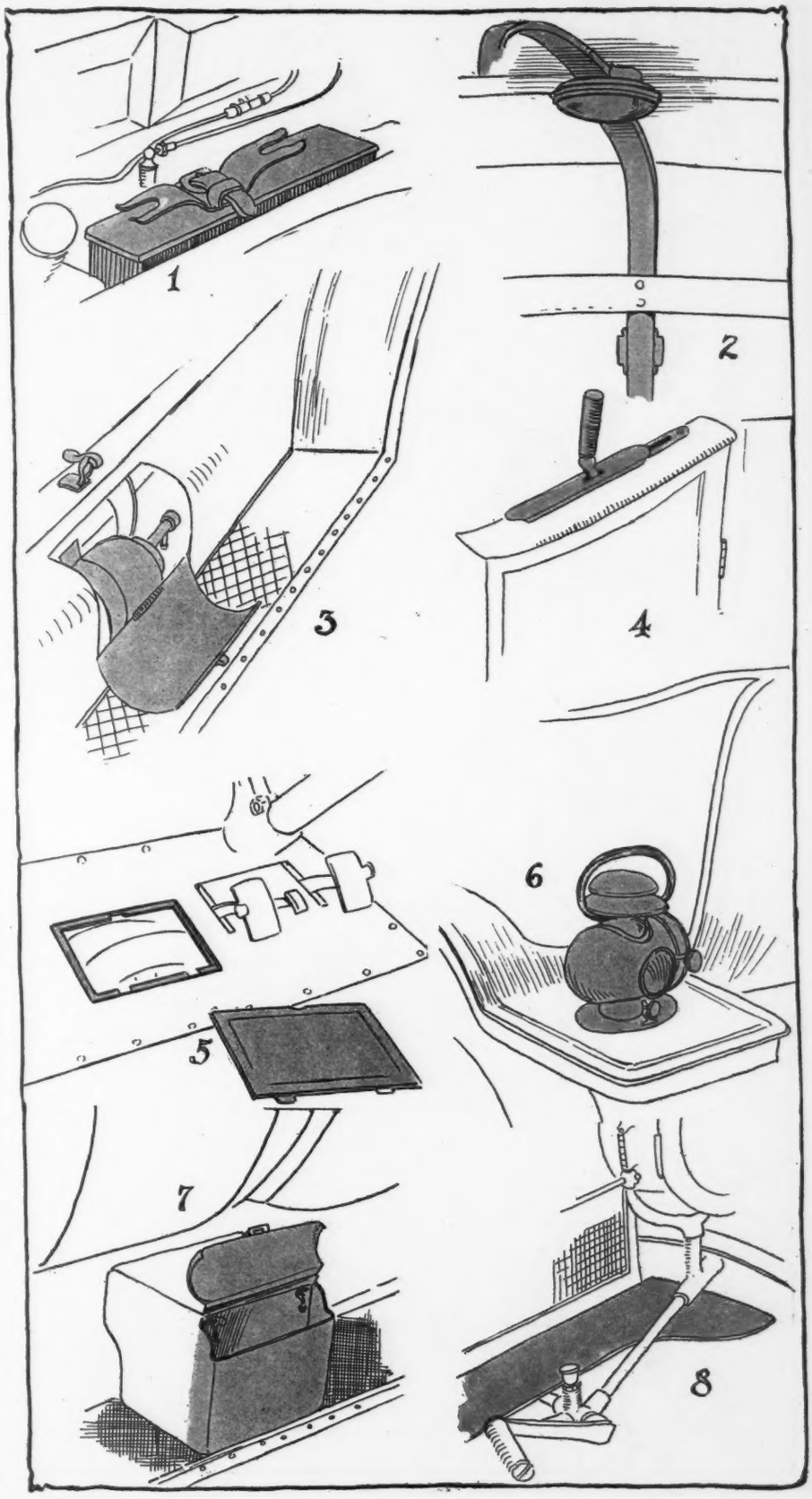


FIG. 6

1—HUDSON'S TOOL-BOX NEXT TO ENGINE; 2—ELECTRIC DOME-LIGHT IN TOP OF THOMAS TOURING CAR; 3—COLUMBIA'S ACETYLINE TANK LOCATION; 4—SLOT COVER ON LOCOMOBILE DOOR LATCH; 5—REMOVABLE PLATE IN HUDSON FOOT-BOARD; 6—PACKARD TAIL-LIGHT ON REAR FENDER; 7—PIERCE-ARROW'S COMBINATION BATTERY AND TOOL BOX; 8—CHALMERS' RADIATOR MUD GUARD.

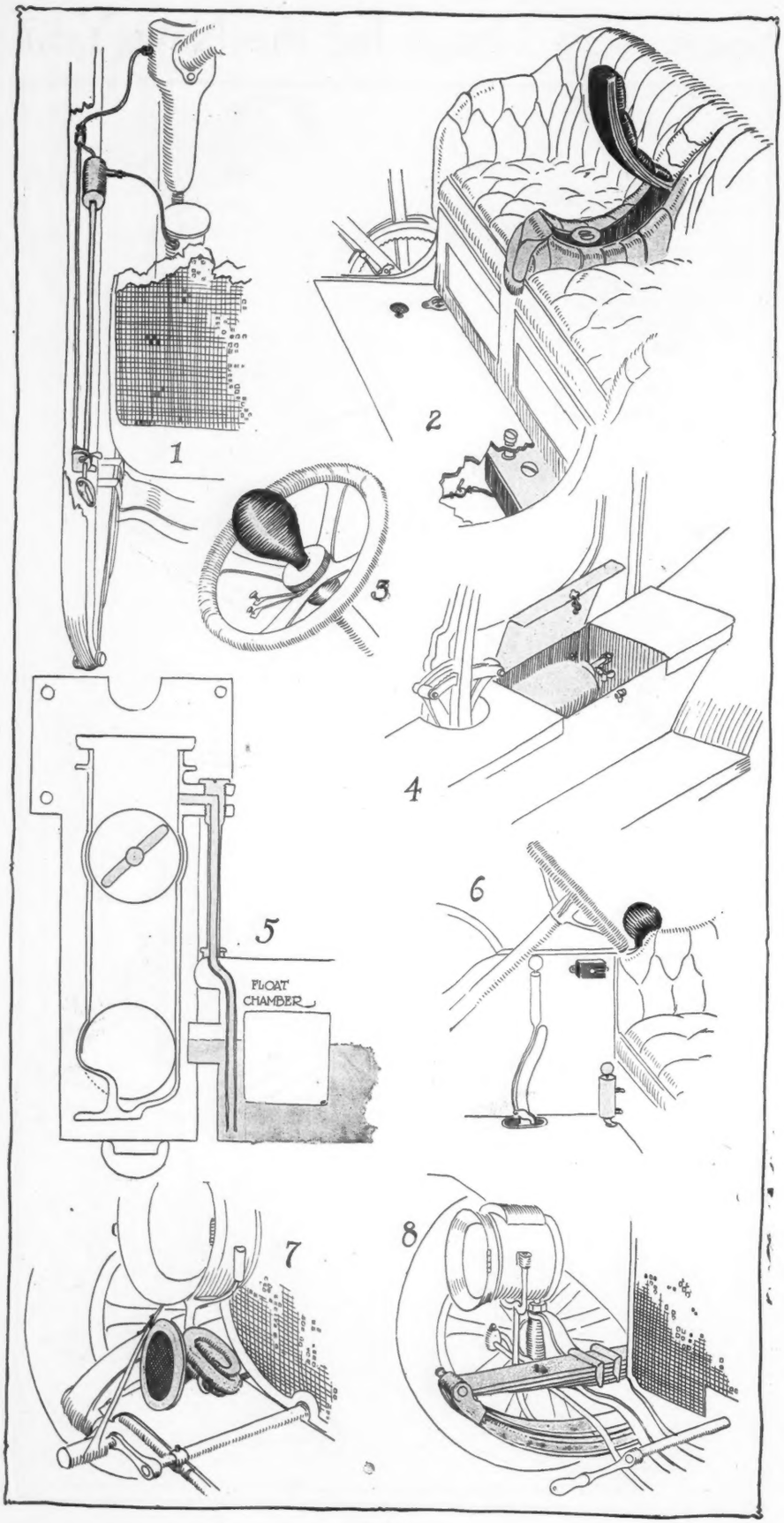


FIG. 7

1—PEERLESS MOTOR PRIMING DEVICE; 2—ROYAL TOURIST'S FUEL AND OIL TANK FILLER-CAPS AND CONTROL VALVES; 3—HORN-BULB POSITION ON ROYAL TOURIST; 4—OLDSMOBILE GAS-TANK COMPARTMENT; 5—SELF-PRIMING CARBURETER ON ROYAL TOURIST; 6—HANDY POSITIONS OF CONTROL DEVICES ON KNOX; 7—PROTECTED LAMP AND HORN LOCATIONS ON ROYAL TOURIST; 8—UNDER-SLUNG FRAME ON NEW REGAL MODEL

pipe of the motor in the form of a spray. This may be done while the motor is being cranked or directly before cranking. Another means of accomplishing the same results is illustrated in part 5. There is a by-pass or tube communicating between the mixing chamber of the carbureter above the throttle valve and the float chamber, and by closing the throttle valve completely by means of the control lever over the steering wheel, when the motor is cranked, a vacuum or strong suction is produced in the intake pipe of the motor which draws a supply of almost pure gasoline direct from the float chamber, as indicated.

Several departures from the conventional line of improvements are shown in Fig. 7, part 2. The filler cap of the gasoline tank is located in a tool compartment arranged in the division between the two front seats. This makes it possible to fill the gasoline tank without removing the seat cushion. At the right side of the floor board, near the edge of the front panel of the driver's seat, a means is provided for shutting off or draining the gasoline supply which may be operated by means of a screw driver. In almost a similar location, at the left side of the floor board, a small filler cap protrudes which, when removed, permits replenishment of the oil carried in the auxiliary oil-supply tank which is arranged as indicated below the floor board.

Signal Operating Devices Improved.

Two examples of the improvements to be found in the arrangement of the warning sound devices are illustrated in Fig. 7, parts 3 and 6. Part 3 shows the bulb of a horn protruding from the end of the steering column over the steering wheel. The air tube communicating between the horn and the bulb passes down through the center of the steering column to the horn, which in some cases is located inside of the engine hood just in back of the radiator, or just in front of the lower portion of the radiator, to one side, on top of the radiator mud apron, as indicated in part 7. Part 6 shows the electric button of a mechanical electric horn located on the inside of the fore door panel, where it may be operated with the side of the leg of the driver. This illustration also shows convenient locations of the reed horn bulb and of a pressure pump just below the front of the driver's seat. Fig. 7, part 8, is interesting in that it shows the spring suspension of the new underslung frame model recently brought out by the Regal company.

Exemplifying one of the means of providing a steadier and more restful means of operating the foot accelerator of a car, attention is called to Fig. 8, part 1. A small wedge-shaped block is mounted on the footboard at the side of the accelerator pedal, which has a smooth metal strip upon it. The side of the sole of the shoe may be rested upon this block while the inner side rests upon the pedal. By sliding the

toe of the foot inward and downward on the wedge, the accelerator pedal is pressed downward; and by sliding it outward the foot slides up on a wedge and the pedal is released. Fig. 8, part 2, shows a new means of clutch pedal adjustment.

Power Tire Pump Fitted

Tire pumps operated by the motive power of the car are found on a number of cars this year. In Fig. 8, part 3, a four-cylinder tire-pump is shown, which is attached at one side to the forward end of the transmission gearcase and operated off the end of the countershaft of the gearset mechanism. A permanent metal tube connection communicates between the cylinders of the air pump and a coil of rubber hose, which is kept under the driver's seat. To use the pump the driver has but to lift his seat cushion, attach the end of the coil of hose to the tire to be inflated, and connect the crankshaft of the tire pump to the countershaft of the gearset by means of a little clutch lever on the end of a rod which pierces the side member of the frame.

Fig. 8, part 4, shows a very convenient means of replenishing the oil supply in the gearcase of a rear axle. Part 5 of the same illustration shows a means of opening all the priming cocks of a motor simultaneously by means of a rod passing through the dash. This is by no means new, but often very convenient. In part 6 a method is shown of giving access to the oil cups on the front ends of the rear vehicle springs. Instead of providing a small door in the side of the dress guard, the whole dress guard itself is hinged at the bottom and may be lowered, as indicated. Part 7 shows a very simple and ingenious means of locking the hub cap of a motor wheel in place. Some makers use one or more studs or screws arranged at intervals around the circumference of the hub cap to prevent its being lost; but in this device no tool is necessary to remove the screws or studs, as one has merely to disengage a pin which passes through a hole in the hub cap and fits into a recess in the hub of the wheel. The pin is carried on the end of a curved blade spring, hinged at one end to the hub cap, so there are no loose parts.

In Fig. 8, part 8, a convenient location for an oil indicator and an example of a large accessible cap is illustrated. Part 9 illustrates a clutch operating mechanism in which the clutch yoke instead of having a plain bearing employs two large Hess-Bright ball bearings arranged diametrically above and below the clutch shaft and tegral with a part of the universal joint employed between the clutch and gearset. Fig. 8, part 10, shows a key in the switch of a coil box adapted to lock the switch of the ignition system in the neutral position, so that the motor cannot be run by garage employes or other undesirable parties. Many cars are equipped with lockable ignition switches this year for this very same purpose.

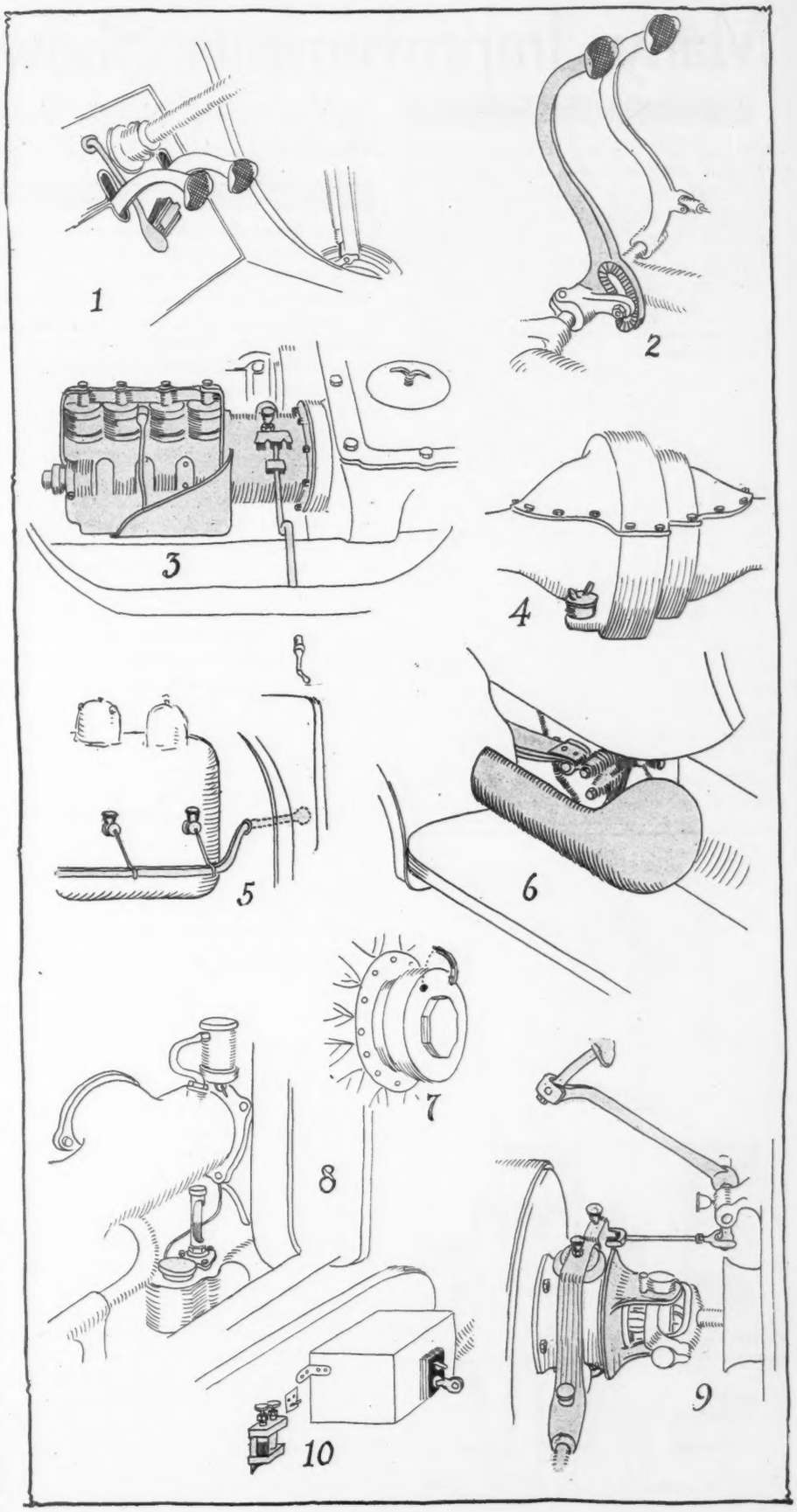


FIG. 8

1—WEDGE-SHAPE ACCELERATOR FOOT-REST ON KISSELKAR; 2—KISSELKAR'S ADJUSTABLE CLUTCH PEDAL; 3—TIRE AIR-PUMP ON PEERLESS GEARSET; 4—OIL FILLER CUP ON POPE-HARTFORD; 5—POPE-HARTFORD'S PRIMING AND RELIEF COCK CONTROL; 6—HINGED DRESS GUARD ON PEERLESS; 7—PEERLESS HUB-CAP LOCK; 8—LARGE FILLER-CAP AND OIL GAUGE ON OLDSMOBILE MOTOR; 9—POPE-HARTFORD'S CLUTCH OPERATING MECHANISM; 10—PEERLESS IGNITION SWITCH LOCK

Many Improvements Shown in Leading

Control of the Needle Valve in the Nozzle Through the Throttle or by Vacuum Getting Attention from Designers

THERE are two unmistakable trends in the carbureter field for this season, one is the control of the gasoline flow through the nozzle and the other a more accurate control of the air admitted through the auxiliary air valve. A few years ago a spraying nozzle was something in the mixing chamber of a carbureter with an opening like the end of a straw when thrust into a glass of lemonade; there was a certain amount of delicacy connected therewith but it was not accurately worked out. In those days an auxiliary air valve was one held shut by a spring—the spring might be of any standard shape and the problem had not been gone into very deeply whether it would retain its tension for a week, a month or a year.

For this year there has been a general attempt all along the line both with the concerns building carbureters to sell to the many car makers and with the car makers who build their own carbureters. There are approximately twenty-one car makers in the licensed ranks who build their own carbureters and they have all been busy. Some, like the Maxwell and Alco, have brought out entirely new designs of carbureters and others like Franklin, Locomobile, Royal Tourist, Chadwick, Pierce and Packard have been making improvements of one nature or another.

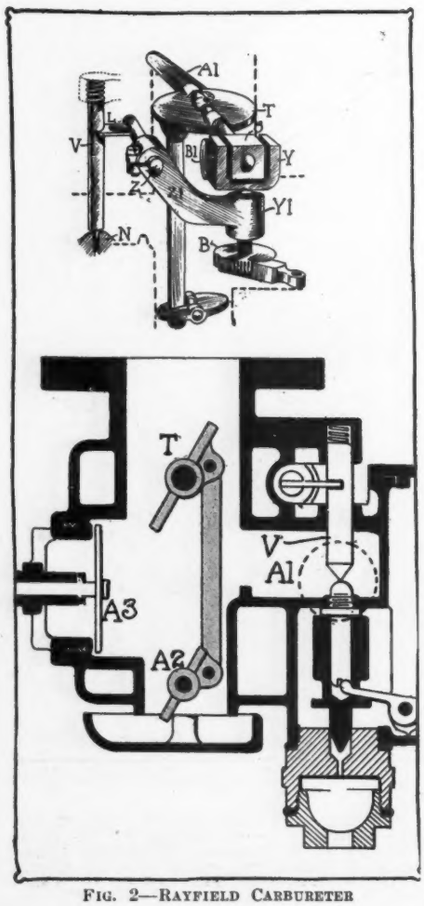


FIG. 2—RAYFIELD CARBURETER

In the regular carbureter field, that is those makers whose business it is to build carbureters and nothing else there has been activity. Schebler has improved a couple of his types with hot air tubes and shutter valves to facilitate starting, these two models being L and F. Stromberg has added a device to facilitate starting. It consists of a shutter valve in the primary air intake and the stem of this valve carries a cam which works against the lower end of the auxiliary air valve stem, holding the valve shut when starting so that with the primary air passage practically closed and the auxiliary valve held shut there is no doubt but that the vacuum created in the motor experts its main influence in drawing gasoline out of the nozzle.

Two Jets in Some

In the Holley two jets are used instead of one. The Kingston company has a new design in which the ball auxiliary air valve is incorporated entirely inside the carbureter so that all of the air enters through the one air passage at the base and up through the venturi air passage. The Bowers carbureter is shown with an improvement in the way of a governor mechanically driven from the motor, which governor controls the opening of the auxiliary air valves, of which there are two.

These are a few improvements to indicate the general feeling that there still remains much to be done in the carbureter field. But this is only a part, because a new crop of makers has sprung up, many of which are pushing along at a marvellous rate. One of the most active of this group is the Rayfield, which has brought out a carbureter featured by the intercontrol of the spraying nozzle with the throttle, so that the gasoline flow is regulated. Another member of the group of newcomers is the Vortex, which creates a spiral spray within the mixing chamber by means of tangential air currents in the venturi. This carbureter also uses an ingenious rectangular-type of auxiliary air valve which is hinged at one side like a door. Then there is the new Deizeman with its two spraying nozzles and a delicacy of interconnection between the two butterfly throttles controlling these nozzles.

There is all through the carbureter field a decided improvement in the workmanship done and it will soon be a fact that with many makers every detail is as carefully worked out as the parts on one of the highest-priced motors. Better machinery is being installed in the carbureter plants; more attention is being given to finishing the parts; the springs controlling auxiliary air valves are being tested for tension before being used; and an inspection of every part and a testing of others are parts of the regular program of manufacture.

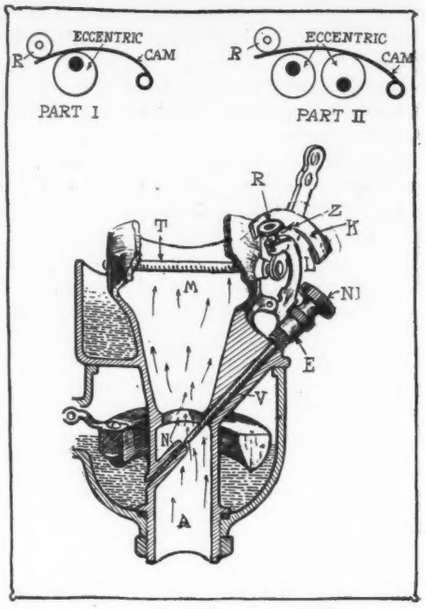


FIG. 1—SCHEBLER CARBURETER

The First Big Question.

All makers have practically agreed that the amount of gasoline used in the carbureter must be controlled and there are two main ways of doing this: The first way is to control the needle valve in the nozzle, that is raise the needle valve when the throttle is opened wider, thereby allowing more gasoline to flow; the other way is to use two or perhaps three nozzles bringing one nozzle into use first and when the motor speed increases bring another or perhaps two into operation. Here follows the general scheme of doing this:

The Schebler Way

The Schebler scheme is to raise the needle in the nozzle each time the throttle is opened. Fig. 1 shows how it is done: The needle valve V is mounted angularly in the casting forming the carbureter body and its lower end enters the nozzle N, located within the venturi-shaped passage A. The end of the needle valve passes through the boss E on a lever L which is fulcrumed to the carbureter casting. The upper end carries a roller R against which bears a cam K, supported from the throttle stem T. Open-

Carbureters and Several of New Type

Hot Water-Jacketing of Mixing Chamber Is Much More General Than a Year Ago and Motor Starting Facilitated

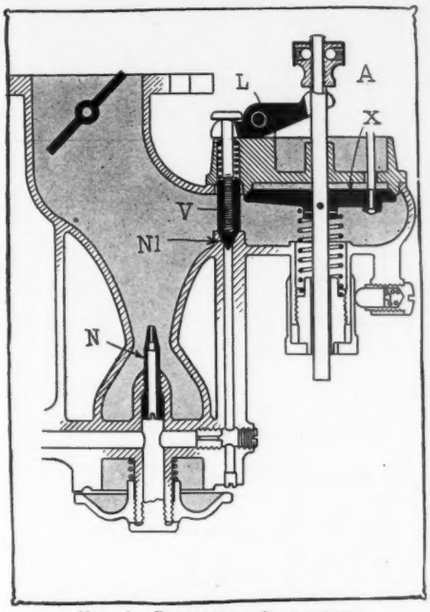


FIG. 4—STROMBERG CARBURETER

ing the throttle forces the roller out in the direction of the arrow Z, thus raising the needle valve. The cam is a curved spring beneath which is an eccentric and by turning this eccentric the contour of the cam is altered so that more lift may be given with the early opening of the throttle, this giving a rich mixture for low-speed work; on the other hand the eccentric may be set to give little lift to the needle valve for the first part of the throttle opening and much lift for the second part of the opening. In Part I, a diagram of the spring cam with the eccentric within or under it is shown; the position of the roller R which rolls over its surface is shown. In Part II is shown the type of cam used on the model L in which there are two eccentrics, one to control the gasoline flow for medium speeds and the other to control the flow of gasoline for high speeds. The needle valve itself can be adjusted by the adjusting nut NI and this is used for low-speed adjustments.

Rayfield Needle Control

A second concern to control the gasoline needle valve with the throttle is the Rayfield, the means of control being illustrated in Fig. 2. In the general scheme of this carbureter, there are three air inlets, a normal one, AI, indicated by a dotted circle; a second opening, A2, controlled by a butterfly valve interconnected with the throttle T; and an auxiliary air valve A3, under control of two springs. The upper part of the illustration shows the interconnection between the needle valve and the throttle. It consists of a lever, ZI, and a short arm L, both carried on a rod Z. The lever L has its other end fitting in a notch in the side of the needle valve; and the lever ZI has its free end beneath a cam Y on the throttle axis. Opening the throttle by a part rotation in direction of arrow, gives the cam a movement in direction of arrow YI. This movement forces down the lever ZI and raises the lever L, lifting the needle valve.

Any range of adjustment between the amount of lift to the needle valve and opening of the throttle may be obtained by shifting the cam Y to the right or left by the adjusting screw BI. Carrying the cam to the right will give a pronounced lift with the first part of the throttle opening; carrying it to the left will give no lift at all with the first throttle opening and considerable lift with the final throttle opening; and a midway adjustment will give a uniform lift in proportion to the throttle opening. There is a further means of varying the needle lift and throttle opening through the adjusting screw B.

Vacuum Valve Control

A different method of controlling the flow of gasoline through the nozzle is used on the Alco carbureter Fig. 3. The needle valve V resting in the nozzle N is supported at its upper end in an auxiliary air valve X which valve forms the floor of a chamber C. Its operation is as follows: As the motor speeds up the vacuum within the combustion chambers demands more air than can enter through the venturi passage A; and as a result some is drawn out of the chamber C through the small hole H. Soon the demand becomes too great for the supply and the vacuum pull is so great within the chamber C that the auxiliary air valve X is lifted upwards from its seating and uncovers the holes HI, thereby admitting air from the outside. But when the valve X is lifted the needle valve V is also raised out of the nozzle N and so more gasoline flows. This is a very sensitive form of interconnection between air and gasoline control and is entirely free from the throttle T. It means that you cannot get more air without getting more gasoline. The amount of lift of the needle valve may be regulated by the adjusting screw G.

Multi-Nozzle Control

Next comes that class of carbureter in which the proportion of air and gasoline in the mixture is controlled by the use of more than one nozzle. The Stromberg is a typical example: This is employed on but one model, namely, model C. It is illustrated in Fig. 4. The main nozzle N is located within the venturi mixing chamber and has not a needle valve within it. The second nozzle NI is placed in the neck of the air passage where the auxiliary air enters. This nozzle has a needle valve V within it, the valve being supported at its upper end by the lever L, which is also attached to the stem of the auxiliary air valve X. This valve moves downward to open and as it is carried down its end of the lever, L is lowered and the other end raised, lifting with it the needle V and bringing the second nozzle into operation. It is apparent that the second nozzle is not brought into use until the auxiliary air valve is opened, and that the more the air valve opens the more is the needle valve lifted. There is an adjustment furnished whereby the relationship between the needle valve lift and throttle opening can be altered, this being the screw A.

The Holley Double Jet

In the new Holley carbureter the second jet is controlled by the auxiliary air valve. The main jet or nozzle N is within the venturi passage, Fig. 5, and takes a

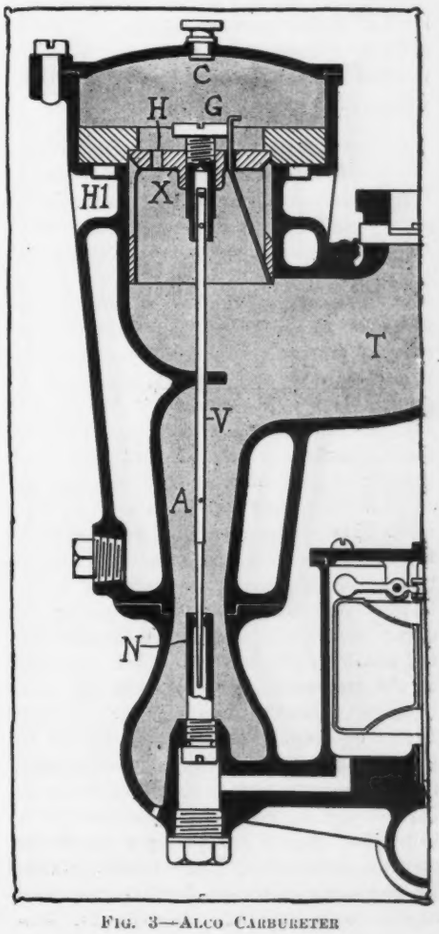


FIG. 3—ALCO CARBURETER

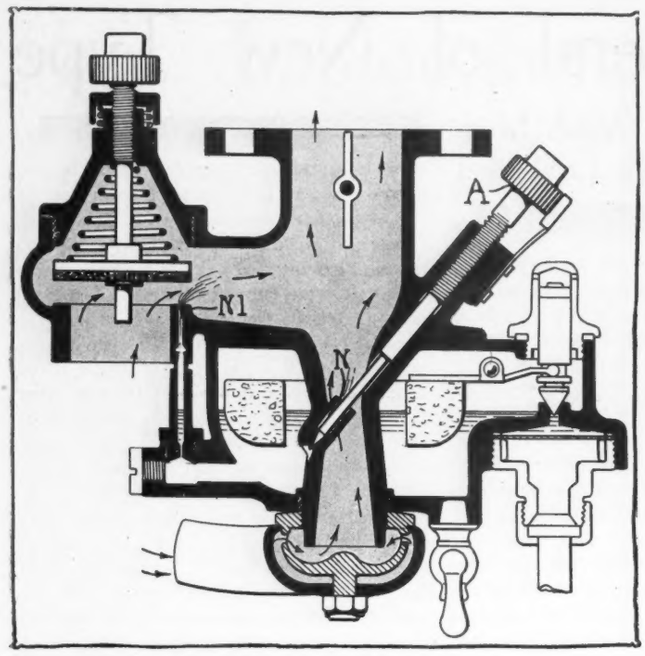


FIG. 5—HOLLEY CARBURETER

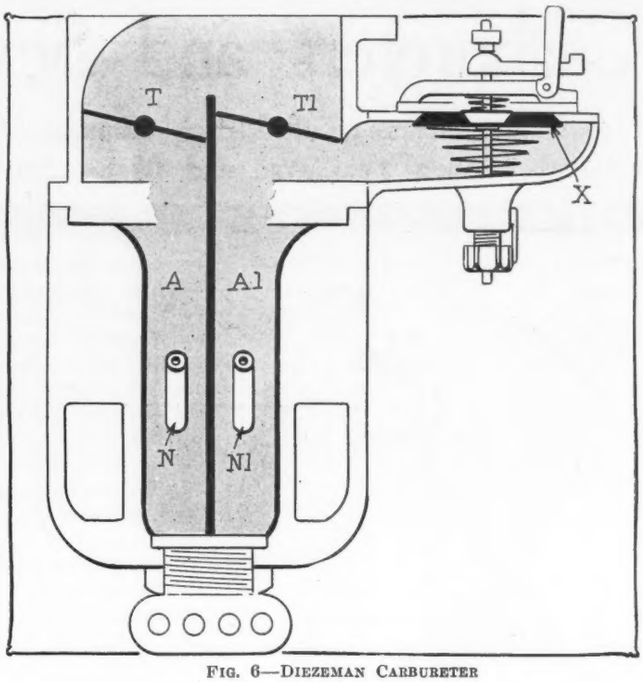


FIG. 6—DIEZEMAN CARBURETER

needle valve with hand adjustment A to vary the size of nozzle opening. The second jet NI is in the seat of the auxiliary air valve so that the instant the valve starts lifting from its seat it uncovers this nozzle and brings it into operation. The higher the lift of the air valve the wider the nozzle is opened. This construction contrasts with the Stromberg in that Holley uses a needle valve in the main nozzle but none in the second nozzle, whereas with Stromberg this is reversed.

Diezeman Has Two Jets

In the new Diezeman double-jet carbureter a wide range of adjustments between the gasoline supply and the air supply is possible. Fig 6 is a diagrammatic illustration of it. It has two parallel vertical air passages, A and AI, which have a common air opening at the base in order that a threaded union for a hot air intake pipe can be attached. In these passages are respective nozzles N and NI, each with an adjustable needle valve in it to regulate the gasoline flow. Above these nozzles are butterfly throttles T and TI, these throttles being interconnected so that the same lever on the steering wheel controls both. Its modus operandi is briefly as follows: The throttle T is first opened, bringing into use only the nozzle N. This throttle is opened to its limit leaving the other throttle TI closed and also leaving the auxiliary air valve X closed. As soon as the maximum of the air passage A is obtained then the auxiliary air valve X begins opening. The motor speed can be increased until this valve reaches its maximum opening. As soon as the capacity of the passage A and the auxiliary air valve is reached then a further opening of the throttle lever will open the second throttle TI, and immediately the auxiliary air valve begins to close. Both throttles are now opened but the air valve X is shut. As soon, however, as the capacity of the two air passages A and AI is reached then the auxiliary air valve begins opening a second time and the final grand maximum of the motor is reached with both air passages and the auxiliary open to the full. In closing the throttle, TI closes first, then the other throttle.

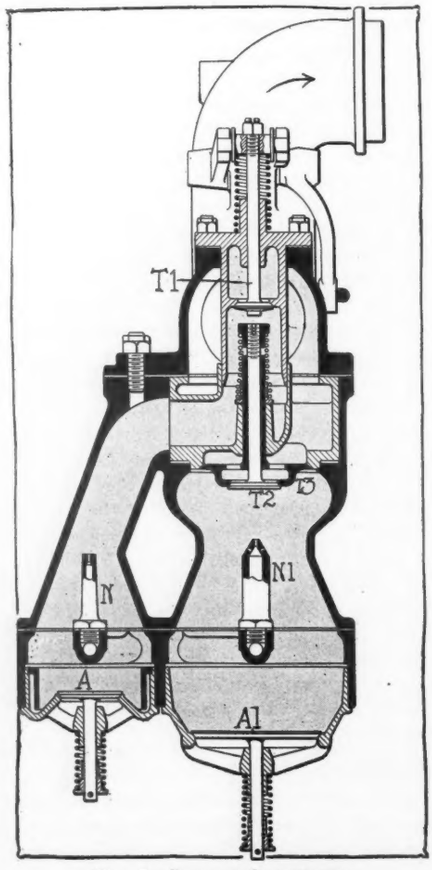


FIG. 7—STEARNS CARBURETER

The Stearns carbureter is a typical two-jet design, Fig. 7, with a smaller jet N brought into use when the smallest throttle TI is opened. The air for this nozzle enters through one passage A which is controlled by a poppet type of valve. The second nozzle NI is brought into use first by the throttle T2 and when more speed is required another throttle T3 is opened which brings the air passage AI to its maximum capacity.

The Polyrhoe Carbureter

A unique form of multiple-nozzle carbureter is the Polyrhoe, an importation from England. On the smaller sizes there are forty-four nozzles and on the larger sizes sixty-four. On one type built for 400-horsepower motors there are 502 jets. The general carbureter scheme is shown in Fig. 8 in which T is a sliding-barrel throttle which uncovers the exit opening E to the cylinders; and P is a vacuum plunger piston which is normally held to the right by the spring S. The piston has a project PI, which when entirely to the right covers the numerous nozzles that are in the side of the passage, the gasoline for these nozzles entering by way of the tube G from the fuel tank, as it moves left it uncovers the nozzles. The main air opening is not shown in this illustration but is in Fig. 9, Part A, at A. It is a rectangular opening shown to advantage at Part D. The door H closes the rectangular opening which door is normally held shut by the coil springs but can be opened to any extent from the dash by the Bowden wire control W. This is the only adjustment on the carbureter. It is a slide door.

A top view of the carbureter is given in Part A, showing the float chamber F, the main air opening and the exit E to the motor. An end view is given in Part C. The method of controlling the many noz-

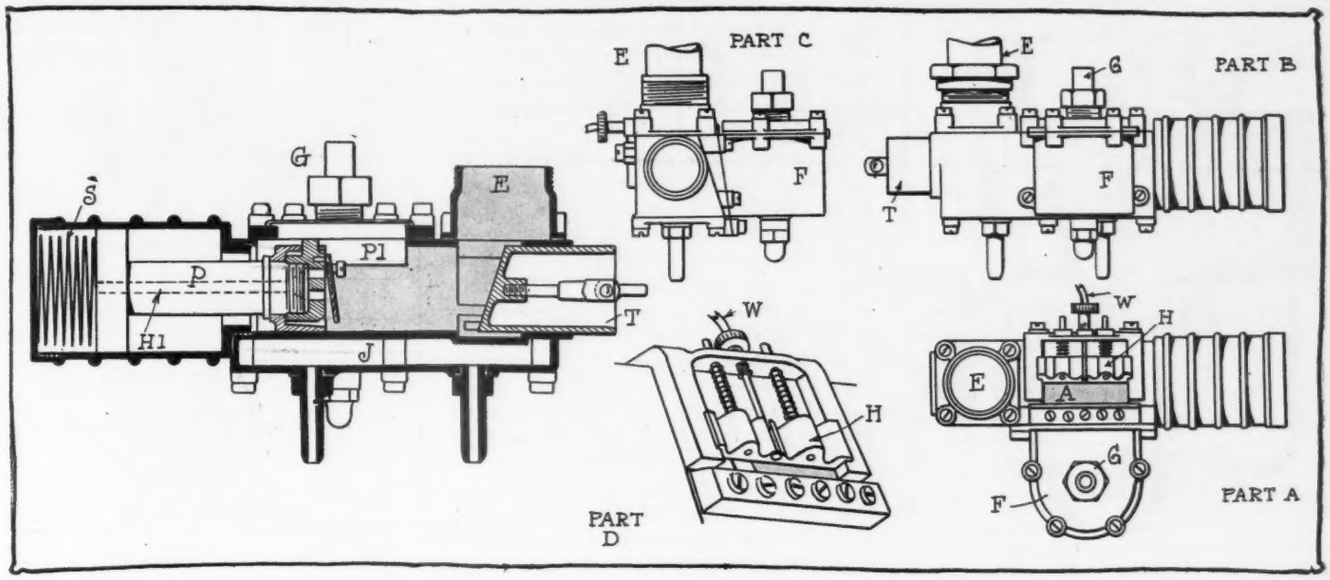


FIG. 8—SECTION THROUGH MIXING CHAMBER OF POLYRHOË CARBURETER

FIG. 9—SHOWING EXTERNAL FEATURES OF POLYRHOË CARBURETER

zles will now be understood by referring to Fig. 8. With the air opened to its normal requirement the motor vacuum draws a part of the air from the space within which the spring S is located through the hole HI in the plunger P. As soon as this happens the plunger P is pulled to the left and begins uncovering the nozzles. The greater the motor speed, the greater the vacuum within the carbureter, the more the plunger P is pulled to the left and the more nozzles are uncovered until finally the carbureter is wide open. The amount of opening of the air valve H has to be determined by conditions and with it the proportions of air and gasoline are regulated.

Some may be wondering how it is possible to get so many nozzles into so small a space. Fig. 10 illustrates this. Part 1 illustrates a thin brass plate containing five slots, 1, 2, 3, 4, 5 which are jets. Part 2 shows several of these plates placed one on top of the other and showing how the jets in the adjacent rows are staggered. In this way each jet is of very delicate construction and yet accurate. In operation you can see the gasoline issuing from the jets in the form of a small spray and also see the number of jets increase as they are uncovered.

Air Control Only

Next comes that large class of carbureter in which the flow of gasoline is controlled entirely by the auxiliary air valve and the hand adjustment of the needle valve in the nozzle: The Kingston is one of this type. As illustrated in Fig. 11 the needle valve V, rests in the base of the nozzle which is an inverted cone, the gasoline level standing near the top of the cone. The auxiliary air valve X consists of a set of five bronze balls of different diameters and weights. As soon as the motor vacuum exceeds the capacity of the venturi-shaped air passage A, the lightest ball is lifted from its seat and more air admitted. As the motor capacity increases the other balls are lifted until with the maximum capacity all five balls are lifted from their seatings and admit five currents of auxiliary air.

The Kingston company has brought out a new design in which the same auxiliary air valve principle is incorporated but in which the balls are enclosed within the carbureter proper so that all of the air enters from the outside through a common air opening at the carbureter base. The feature of this design, which is not illustrated, is that there is not any confusion or sharp angle where the main auxiliary air currents meet.

Another Ball-Valve Type

The G and A carbureter is a French importation, also uses the metal ball auxiliary air valve and is graphically illustrated in Fig. 12. The main venturi air passage A contains the nozzle and the ring of metal balls B forming the auxiliary valve, is at the top and outside of the venturi so that the auxiliary air is drawn in from the outside. These balls are of varying diameter and lift from their seats with varying motor vacuum. The mixing chamber above these balls is water-jacketed to prevent condensation of the mixture due to expansion as it rises in the venturi and also due to the current of cold auxiliary air.

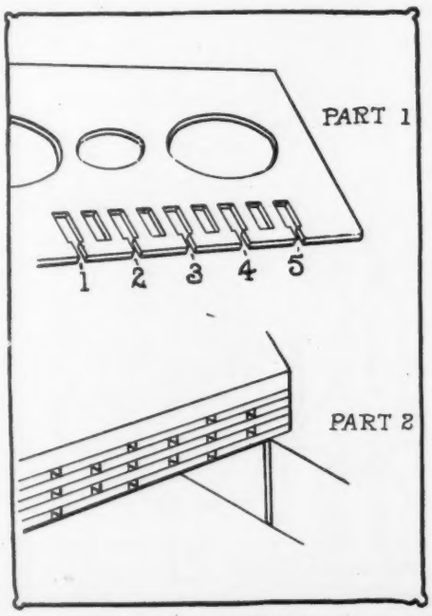


FIG. 10—JET PLATES OF POLYRHOË CARBURETER

Vortex Fuel Controls

In many of the remaining carbureters, the makers depend upon the mixing of air and gasoline in proper proportion on features of carburation. In the new Vortex vaporizer, Fig. 13, an entirely new feature of carburation is brought into use. The general scheme of the vaporizer should be first appreciated. There are three air entrances A1 at the base of which supply rises through the venturi passage; A2 between the top of the float chamber and the base of the mixing chamber which supply goes through two tangential air passages Z and ZI in the venturi; and an auxiliary spiral-shaped air passage, A3, at the top of the mixing chamber. The object of air entering through the passages Z and Z1 is that it enters in a whirl picking up the gasoline which is sprayed out in fan shape from the two slots 1 and 2 against the edges of the venturi and the mixing chamber. As the mixing chamber is amply water-jacketed this whirl carries the heaviest gasoline particles against the heated wall where their evaporation is continued. But this carbureter does not stop its whirling air current set up in the venturi here, but continues it by introducing the auxiliary air through a spiral passage X so that the whirl is continued up to and past the throttle T which is just above the auxiliary air opening. This auxiliary air passage is like a snail shell with the big end at A3 and the small end at the top of the mixing chamber M.

The Bowers Principle

In the model G, Bowers carbureter, a novel form of auxiliary air valve is used.

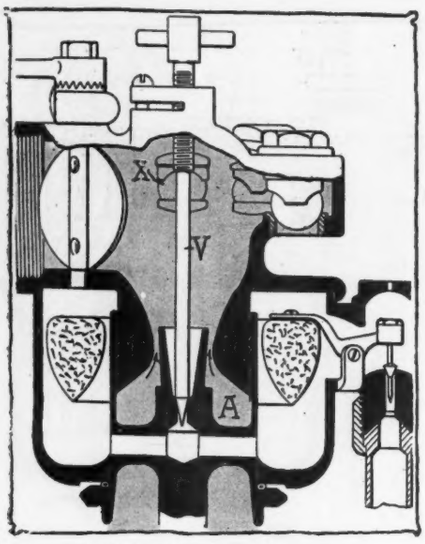


FIG. 11—KINGSTON CARBURETER

Fig. 14 shows it. The main air passage A is a venturi with the nozzle N at its smallest diameter. At the top of the venturi passage is an expansion in the base of which are three openings closed by three leaf springs, 1, 2 and 3. These springs are of varying tension so that one opens first, then the second and finally the third.

This concern has another model which uses two different types of auxiliary air valves, each being a spring controlled poppet valve. It is roughly diagrammed in Fig. 15, showing the venturi V, the concentric float F, the throttle T, nozzle N and main air entrance A. X shows one of the auxiliary air valves and there is another just back of it and of the same size. Part 1 shows their relative position as seen directly from on top. They are at opposite ends of a horseshoe-shaped chamber which has slots, S, leading into the venturi. There is a channel K, common to both, which acts similarly to the equalizer in a set of brakes. If one valve spring tension is heavier than the other, part of the extra air drawn in through the valve with the lower spring tension circles through this passage and so its supply enters through both of the slots S.

This concern has gone a step further in this carbureter and shows one with a governor attached to the two auxiliary air valves. The governor is an old-fashioned one with the two balls which move outward as the speed increases. The shaft carrying these balls is driven either by flexible shaft or bevel gearings from the motor at crankshaft speed. As the crankshaft speeds up the two auxiliary air valves are opened in direct proportion to the increase in crankshaft speed and at the same time. Ordinarily auxiliary air valves with spring control are opened by the vacuum created in the cylinders and through the intake manifold and carbureter mixing chamber. The Bowers people claim that with the governor they get a much more responsive carbureter, one in which every motor stroke is a power stroke and one in which there is not any fluttering of the auxiliary air valve.

Car-Maker Carbureters

The Maxwell company is fitting a new design of carbureter of its own manufacture, Fig. 16. This carbureter has but one adjustment. It is a concentric-float type with a venturi mixing chamber V. The main air supply enters through this. There is an auxiliary air system composed of a series of metal cups X, of different diameter and weight. These cups act as the metal balls in the ball-type and being of different diameter open progressively according to the motor vacuum. The one adjustment of this carbureter is at A and consists of a crescent-shaped valve S, in the main air passage. By a handle shown this valve can be rocked to limit the size of the main air opening to any desired extent. In this way the period at which the auxiliary air valve cups lift is altered and the amount of gasoline flowing through the nozzle is also regulated through this one adjustment.

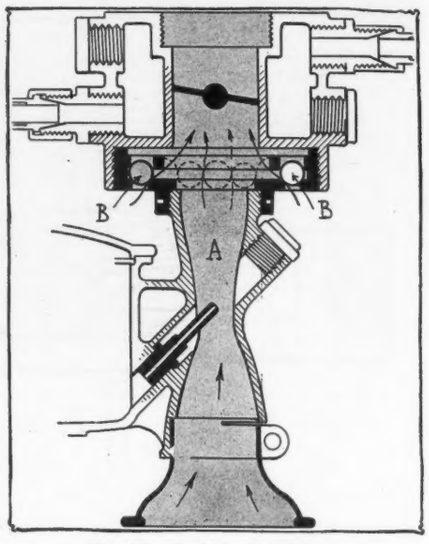


FIG. 12—G. & A. CARBURETER

Royal Tourist Starter

On the Royal Tourist carbureter, Fig. 17, a little device to facilitate starting is fitted. It consists of a small diameter gasoline pipe, P, which enters the intake pipe above the throttle T and at its lower end A, shown in the float-chamber sketch to the right, enters a well in the float chamber. To start the motor and for slow

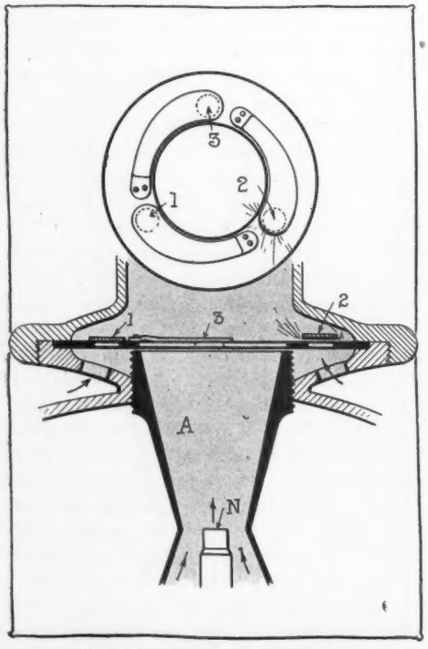


FIG. 15—BOWERS CARBURETER

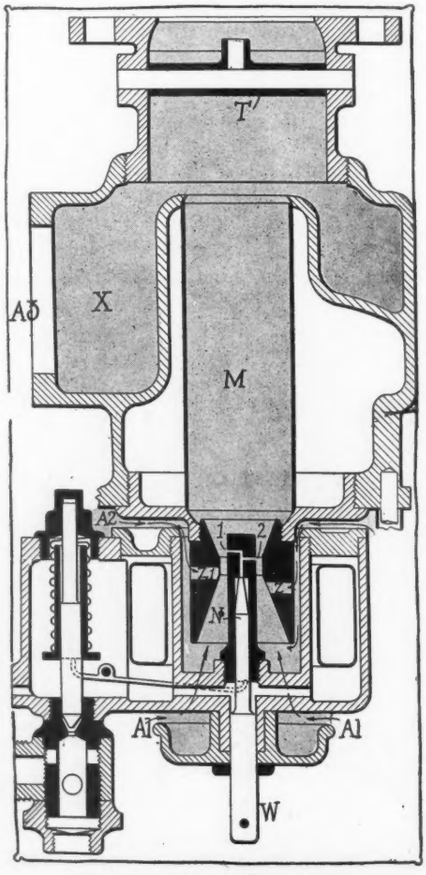


FIG. 13—VORTEX CARBURETER

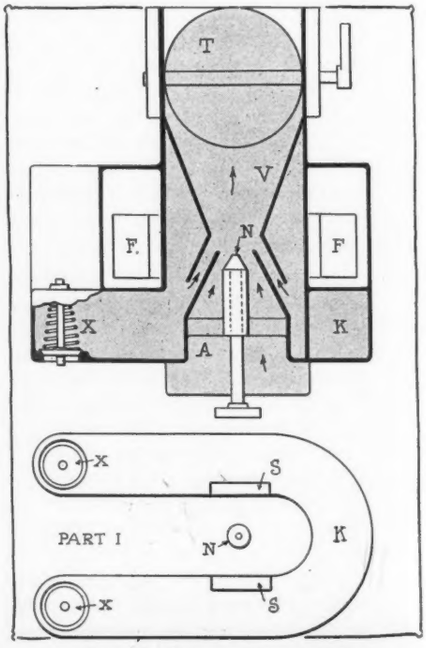


FIG. 14—BOWERS CARBURETER

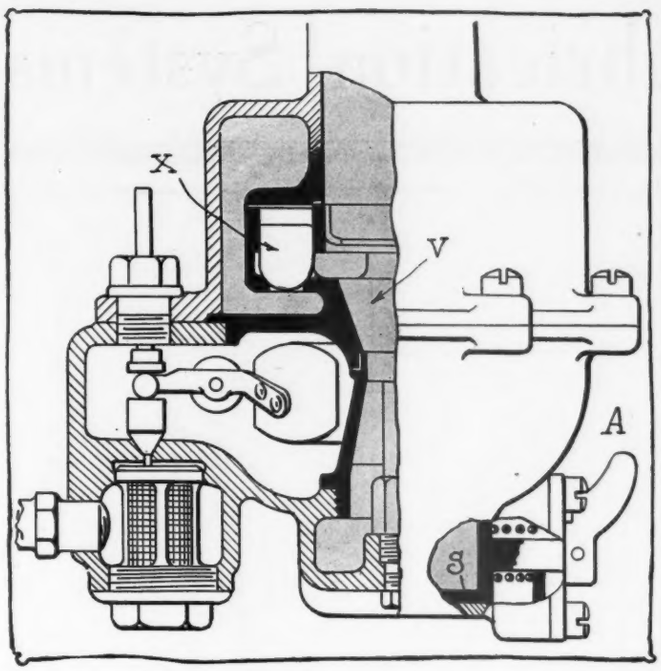


FIG. 16—MAXWELL CARBURETER

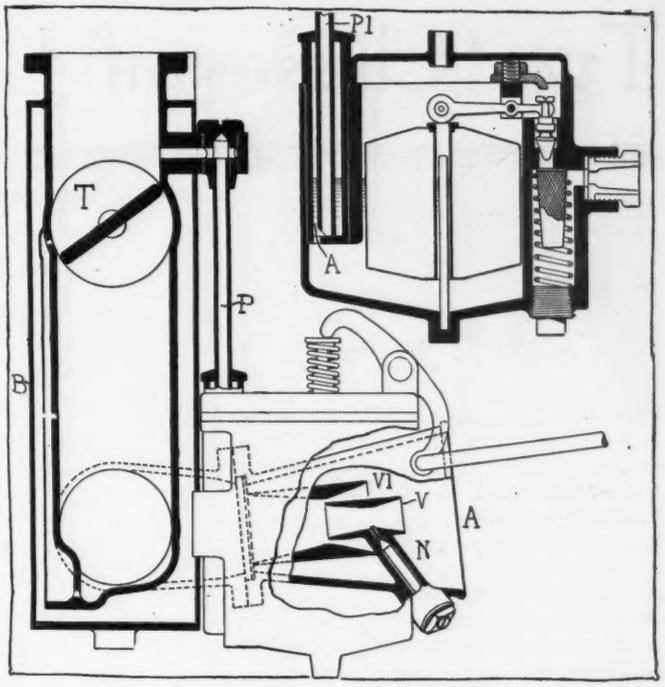


FIG. 17—ROYAL TOURIST CARBURETER

speed the throttle T is closed and the air enters through a bypass channel B. The motor vacuum is so great, however, owing to the small size of this bypass, that the pure gasoline is pulled up the pipe P and a rich mixture obtained. The nozzle N in this carbureter is peculiarly located just inside the main air passage A. It is within a double venturi tube, the smaller one V, and a larger one VI. With this construction the current of air past the nozzle is kept down and so the gasoline supply conserved.

Chadwick Prevents Recondensation

The Chadwick company has gone further than many others to obtain thorough vaporization. Fig. 18 illustrates its new carbureter. Its scheme is heat by water-jacketing. In the first place the intake manifold is water-jacketed entirely up to the valve cage level by the jacket spaces. The mixture is further warmed by a water pipe, W, which is carried down from the cylinder jacket through the inside of the intake manifold. In this way there is no loss of heat from this pipe by radiation, as all of the radiated heat is right where needed. But there is more water-jacketing. A hot water pipe, WI, extends down to the main air intake and is coiled around at this entrance so that perforce all of the entering air must pass over these warmed coils. With this precautionary system the air is warmed and every effort made to keep the mixture from condensing until it reaches the cylinders. This carbureter has a connection between the throttle and the spraying nozzle to give more gasoline with a wider throttle opening.

Many of the regular car builders have added immeasurably to the efficiency of the carbureters by slight improvements of one nature or another. The Franklin has been improved by a new auxiliary air valve, Fig. 19. This valve is controlled by two springs, S and SI, used to prevent too sudden an inrush of air when the throttle is opened. These two springs are controlled in tension by the hand wheels below them. The tension of the springs differs, so that one compresses first and then the other.

Two details which are characteristic of the Packard carbureter are illustrated in Fig. 20. One is the wedge W, which is inserted beneath the seating of the auxiliary valve spring, in this way changing the tension of the spring. This wedge is controlled from the dash and is often used to assist starting, the wedge inserted to stiffen the spring just before the motor stops and after the ignition is cut out.

(Continued on page 69.)

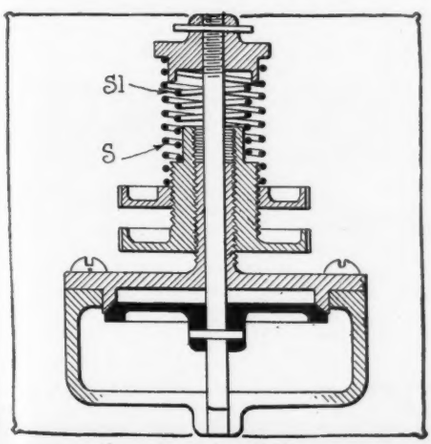


FIG. 19—FRANKLIN AUXILIARY AIR VALVE

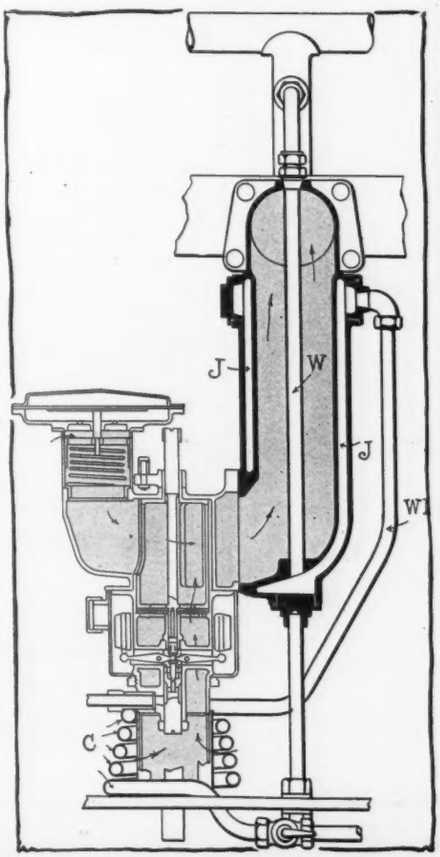


FIG. 18—THE CHADWICK CARBURETER

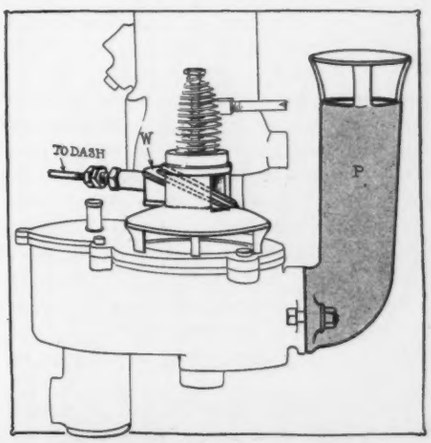


FIG. 20—PACKARD CARBURETER

Two Classes of Lubrication Systems

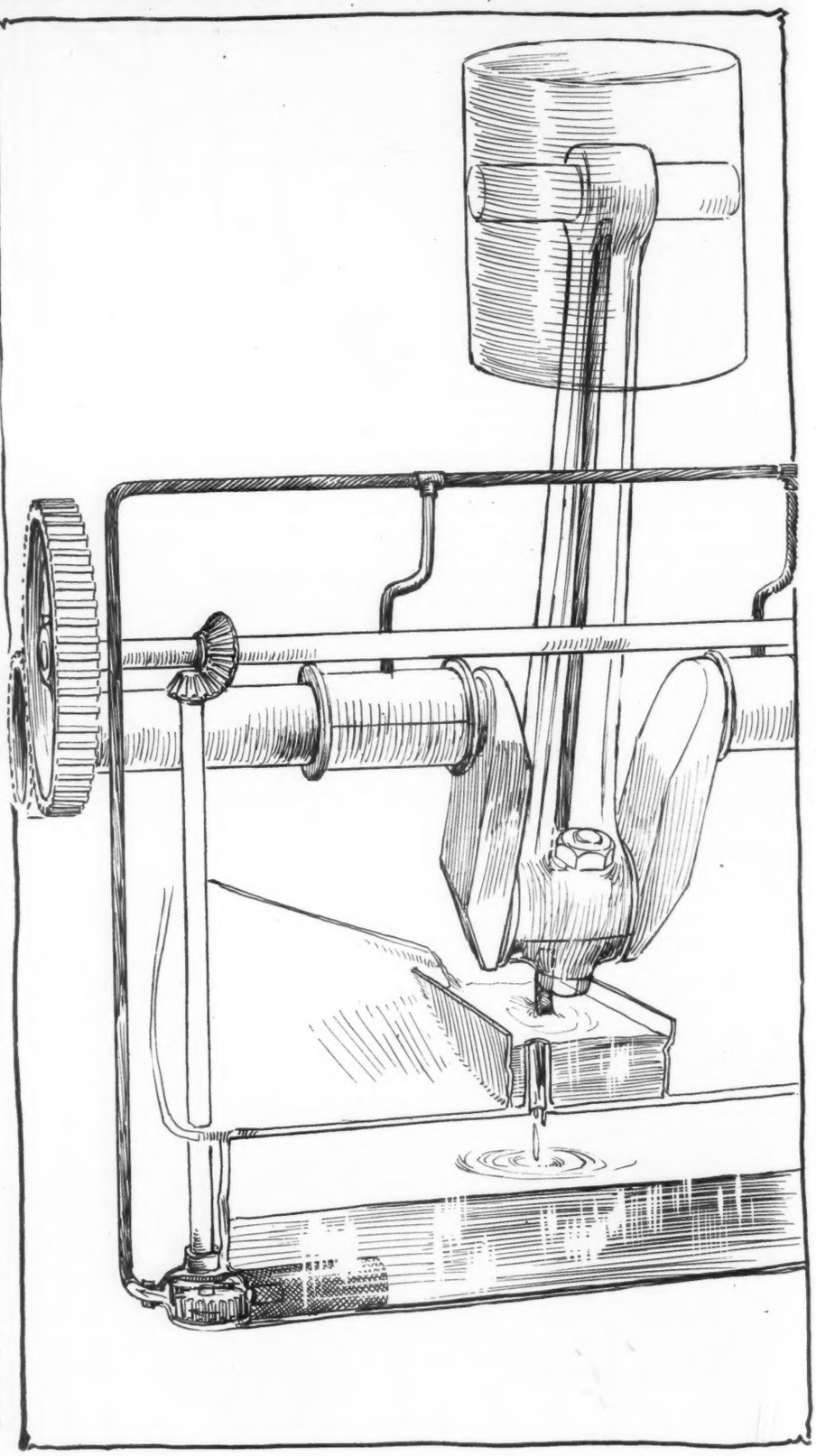
THERE are but two grand classifications when it comes to the lubrication of a gasoline motor: One is the circulation system, the other is the non-circulation system. The circulation system is roughly patterned after the circulation system of the blood in the human body. Everybody is familiar with the blood flow, how it is pumped from the heart through the aorta or main artery and which has its ramifications to every part of the body, dividing and subdividing as it does until the artery becomes an almost inconceivable issue of blood through the farthest tissues of the body, but still forced on in its course by the pulsation of the heart. Then comes the return journey, the trip back to the heart through the veins, starting as it does with the veins that are as small as the minutest arteries and these uniting, as branches of a river system, until the big main vein leading into the heart is reached. The heart forces it through the arteries and then draws it back by its suction force, if the term may be used, through the veins.

But there is another system in the blood circulation, namely the purification circuit, that in which the heart pumps it to the lungs where it throws off its load of impurities and takes on a load of good fresh oxygen and is then brought back to the heart again by the heart's own action. This completes what might be called the double circulation system of the blood, it being sent all through the body laden with its materials for its work, then brought back with its impurities and sent to the scavenging ground to get rid of these and pick up its useful load.

The Circulating System

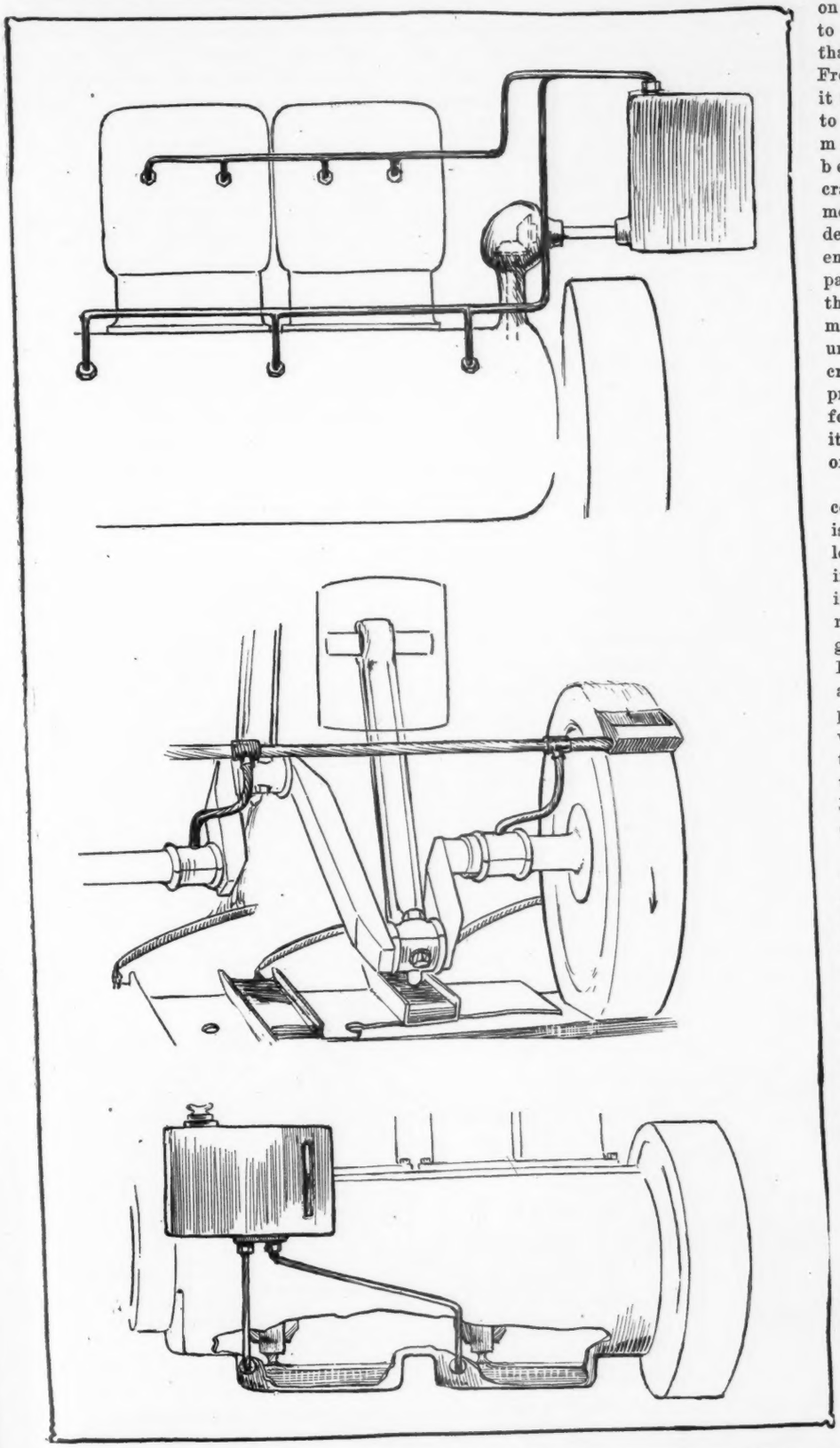
In the circulating oiling system of the motor the situation is a million times smaller but not so efficient. A typical system is illustrated on this page. The oil pump is the heart. Sometimes it is a gear pump, sometimes a plunger pump, sometimes a rotary pump. It is generally driven from the camshaft by bevel, worm or spiral gears. The lubrication differs from the human circulation in that the oil pump has a reservoir filled or partly filled with oil which it draws from; in the heart there is no such reservoir; nature manufactures to meet its demands; supply and demand in the healthy body are always in equilibrium.

The oil pump delivers its oil supply through a brass or copper pipe, call it an artery if you wish, through a sight feed



A Typical Circulating System Used in Motors of Today in Which the Pump Is Likened to the Heart of the Human Body

—Circulating and Non-Circulating



THE MECHANICAL-OILER SYSTEM OF MOTOR LUBRICATION; THE FLYWHEEL CIRCULATION TYPE; AND THE GRAVITY-FLOW SCHEME

on the dash simply to tell the driver that it is working. From this sight feed it flows in obedience to the pump to the main crankshaft bearings, to the crankcase compartments, to the cylinder walls, to the timing gears at the front end of the motor, to the camshaft compartment or to whatever part the engineer thinks is best for his particular design of motor. Here its work begins, here it undergoes its real test. If led to the crankshaft bearings the test is not a supreme one, the real merit of the oil is found in the combustion chamber, where it oils the cylinder walls and piston rings of the motor.

With circulation systems it has been common practice with many to use what is known as the de Dion system; that is, lead the oil direct to the crankshaft bearings, to the lower connecting rod bearings and also to the upper connecting rod bearings or the wrist pin bearings as generally understood. The Pierce-Arrow, Knox, Marmon and some others are examples of this system. It is a positive pressure system. The throw-off from the wrist pin bearing should be sufficient for the cylinder walls and piston rings. With this system, the Knox uses a splash also, but the Pierce does not.

Trough System Gaining

One feature of the circulating system that is coming to the front today is the trough system into which a scoop on the lower end of the connecting rod dips. The trough is small, perhaps it does not hold more than half a cupful of oil, but it is enough for the scoop to dip into. Part of the oil is forced up through a hole in the scoop into the connecting rod bearing and more is splashed into a mist and rises onto the cylinder walls. The merit of the trough is that there is not too much oil splashed up. Splashing oil is not the best thing in the world for it, and the less it is splashed, the better. It is preferable to have a small scoop on the connecting rod cap dip into the trough than have the big end of the connecting rod splash into a big volume of oil.

In Europe there are a couple or more concerns using the Knight motor which use these troughs and hinge them at one end and mount them on an eccentric at the other end. The eccentric connects with the throttle so that with more gasoline and faster motor speeds the troughs are raised to give more oil, because more is needed; and with low throttle the

troughs are lowered so that the splash is reduced. In America the Hupmobile, with its gravity system, interconnects the oiling system with the throttle. It is a good system to follow out. It avoids smoking when running slowly and avoids seizing of pistons when running at high speed.

The Lungs of the System

Once the oil has done its work in a circulating oiling system, it is drained by gravity back to the oil reservoir, but en route it generally passes through the lungs of the system, which consist of one or more thicknesses of fine wire mesh, which are supposed to arrest any small metal particles, or carbon particles, that might be carried off. It must not be overlooked that, like the human blood, the oil should play the role of a scavenger, in carrying out of a bearing any small particle of metal or carbon. Where the oil is literally pushed through a bearing by the pressure of an oil pump, the possibility of the scavenging program being carried out is more of a certainty.

But the good features of the circulating system stop short and they leave the dirt in the wire mesh just as if the impurities were to be left in the lungs instead of being exhaled through the respiratory organs. The wire mesh becomes the garbage can of the system and if a lot of dirt collects in the mesh on one circulation all of the successive circulations have to pass through it. Some of the makers have realized this and have provided means whereby the mesh can be taken out by simply removing a threaded plug in the base of the oil reservoir, but others have forgotten this prime essential and there is no possible way of cleaning the screen except by taking the pump shaft apart and dropping the lower half of the crankcase. Here is a place where accessibility is needed. The same is true with reference to the oil pump, in some cases it has a jaw coupling in the shaft and a threaded plug beneath it so that it can be taken off and a new one fitted without having to loosen the lower half of the crankcase.

Non-Circulating Systems

So much for circulation systems. All other systems are non-circulating systems—they just feed the oil into the crankcase or cylinders, like you pour tea into a cup. It remains there and is splashed and splashed until it is used up or has to be drained off. Some owners of cars with non-circulating systems forget to drain it off; they just keep pouring more in whenever needed, but never seem to think that there must be some dirt inside that should be wiped out with a clean cloth.

In the non-circulating oiling systems a great variety of arrangement is used, some of the concerns mounting a cubical box on the crankcase inside of which is a set of six, eight, ten or twelve plunger pumps, each pump forcing oil through a separate pipe to some bearing or a cylinder. There are many makers who do not use this multi-pump system but use only two pumps. One of these is the Packard, which, as Fig. 2 shows, has two plunger pumps carried on the left side of the crankcase and driven from the camshaft. Both pumps draw their supply from a large reservoir tank between the cylinders and after forcing it through sight feeds on the dash the oil flows through leads and to the two compartments of the crankcase in which a splash level is maintained. All the parts of the motor such as three crankshaft bearings, all camshaft bearings, wrist pins and cylinder walls are lubricated from the splash. In each crankcase compartment is a drain plug and there is also a drip cock on the side at the top of the proper oil level so that excess oil which would cause smoking can be drawn off.

In the four and six-cylinder Franklin motors a rectangular oiler is carried on the exhaust side of the motor close to the base. This oiler serves as a reservoir and also carries a series of double pumps, one pump forcing the oil through a sight feed on the top of the oiler and the other taking it from the sight feed and forcing it to small cups P, Fig. 1, on each of the main bearings of the crankshaft. Each cup or pocket P communicates with a groove ⅜-inch wide and 3-64-inch deep cut circumferentially for 170 degrees in the upper half of the bushing. Another smaller groove intersects this at right angles and extends almost the full length of the bearing. In order to oil the lower connecting rod bearings grooves P2 and P3 are drilled in the shaft so that the

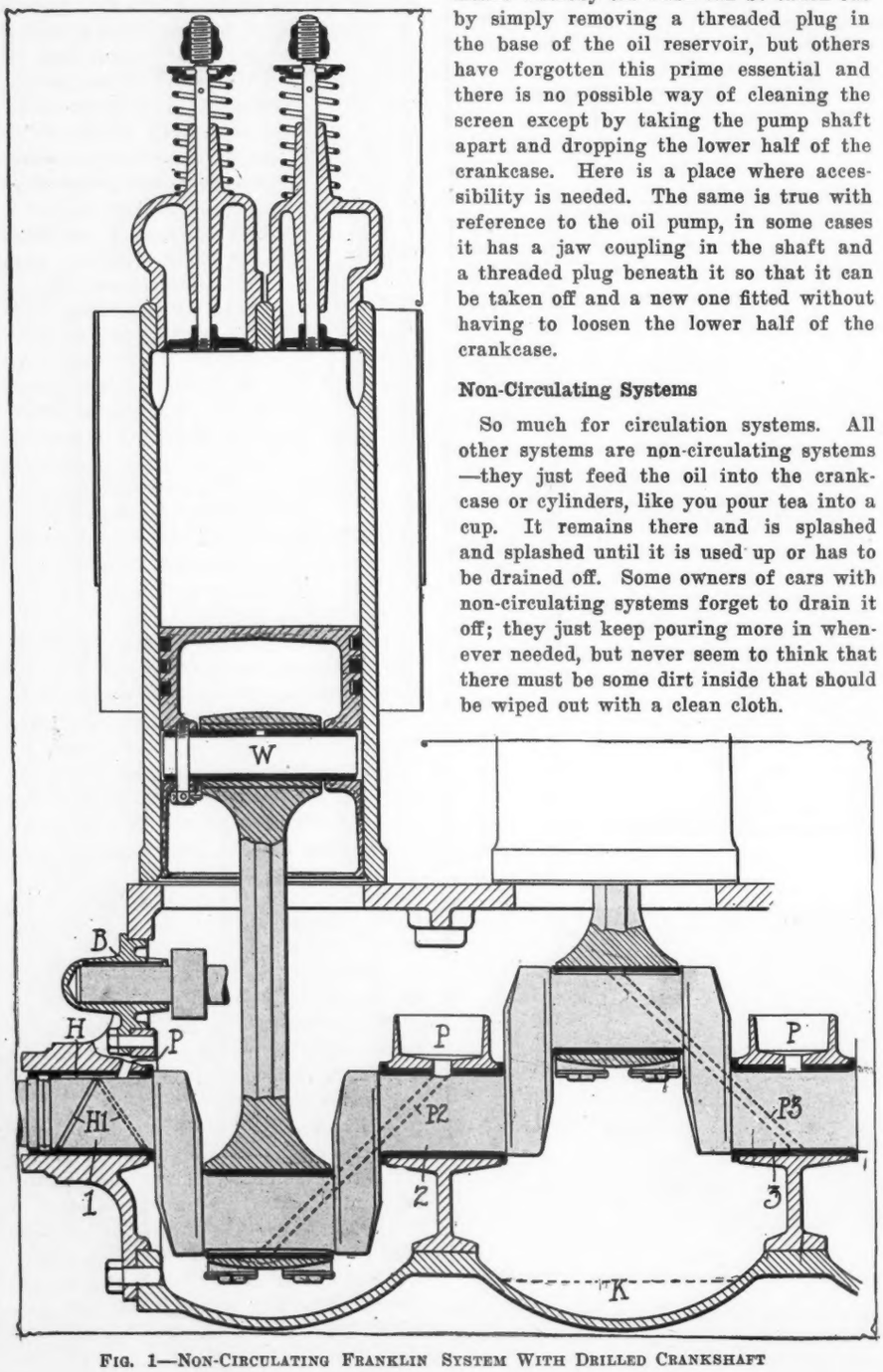


FIG. 1—NON-CIRCULATING FRANKLIN SYSTEM WITH DRILLED CRANKSHAFT

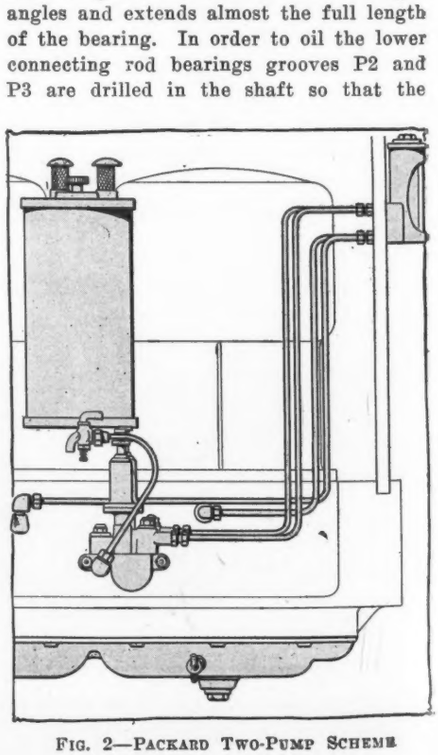


FIG. 2—PACKARD TWO-PUMP SCHEME

oil flows from the grooves in the main bearings into these ducts and through them to the connecting rod bushing which has grooves in it also. It will be noted that No. 2 bearing through duct P2 oils No. 1 connecting rod; and No. 3 bearing oils No. 2 connecting rod. Special oiling provisions are made for No. 1 or the front bearing to which an oil pipe does not lead. This bearing has an oil pocket P which is filled by the splash. The oil is led through a short duct to the bearing and along the top of the bearing is a horizontal passage H. There are circular circumferential oil-ways H1 and at the forward end of the bearings is a circumferential or ring-like oil way which connects with a return passage to the crankcase, thereby preventing leakage through the end of the case. The rear crankshaft bearing is similar to No. 2 or 3 except that it has the circular groove to drain back to the case. The ends of the connecting rods dip very slightly into the oil level K in the base beneath each cylinder. The other motor parts are oiled by the mist thrown off the connecting rods and which is the overflow from these bearings and in addition by the splash created by the ends of these rods dipping into the level K.

The Two-Cycle Elmore

The two-cycle Elmore, Fig. 5, uses a non-circulating system with the supply carried in a reservoir L located in the crankcase arm. A bank of pumps forces oil through leads 1 and 3 to the crankshaft bearings, through lead 2 to the intake manifold, where the oil is carried in with the mixture into the combustion chamber and through lead 4 onto the gears for driving the rotary valve which governs the intake of mixture to the different cylinders. The usual pockets P are provided over the crankshaft bearings to collect oil from the splash where an oil lead does not go direct to the bearing. As the end section of the motor shows, each connecting rod carries its scoop S, the arrow showing how the oil passes into the bearing through the scoop. The bearing also has a duct H through which the splash oil leads direct to the inside of the bushing. The wrist pin bushing is cut away at K to allow of the splash oil entering the bearing direct.

The Gravity Systems

There is used in the E-M-F, Flanders, Everett, Hupmobile and one or two other makes of cars what is known as the gravity oiling system in that the usual plunger, gear, centrifugal or other type of pump to drive the oil to the required parts of the motor does not exist. There is no pump at all. There is nothing but a large oil reservoir filled with oil which flows into the crankcase solely in response to the laws of gravitation. In Figs. 9 and 10 the Hupmobile gravity system is illustrated. On the side of the cylinders is a cast iron tank R of 3 pints capacity. The tank is integral with the water pipe W to the cylinder jackets, the pipe passing through the tank and helping to maintain an even temperature of the oil. From this tank the oil flows through two pipes M to the two compartments of the crankcase. The flow of the oil is manually regulated by means of a lever L which has a ball-and-socket connection with the throttle control. This lever connects indirectly with the two plungers which regulate the oil flow through the pipes M. The detail of each plunger is shown in Fig. 10 and consists of the plunger with its pointed end F and tapered seat E in the base of the oil tank. The upper end carries a roller B and surrounding the plunger stem is a spring I. The method of operation is briefly as follows: The lever L, Fig. 9, connects with a shaft along the top of the tank, which shaft carries two cams K, these cams being marked C in Fig. 10. When the throttle is opened to get more speed the cams C riding under the rollers B raise the rollers and plungers, allowing the oil to flow to the crankcase, the flow being entirely in proportion to the throttle opening, the wider the throttle is opened the more oil flows. The system in this respect is similar to some of the latest oiling innovations in Europe in which the oil troughs, beneath the connecting rods in circulating systems, are raised and lowered as the throttle is opened and closed, giving more oil when the motor is working harder and reducing it as the motor speed

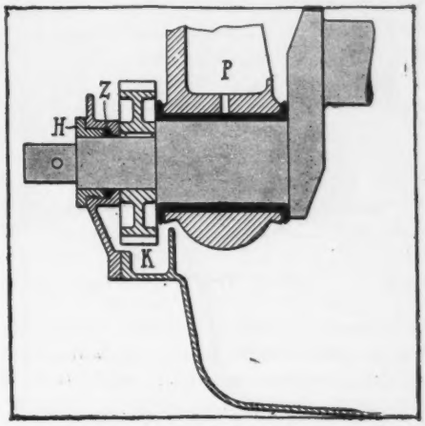


FIG. 3—FRONT CRANKSHAFT BEARING ON STODDARD—P, OIL POCKET; Z, PACKING; H, RETAINING RING

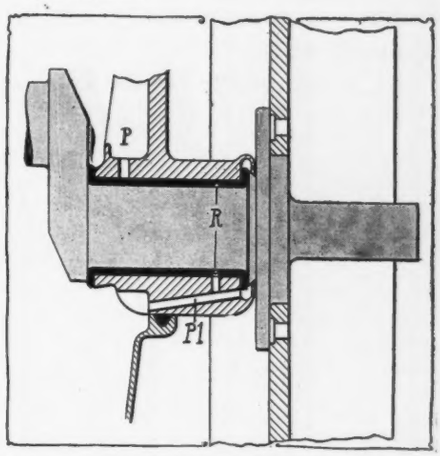


FIG. 4—STODDARD REAR CRANKSHAFT BEARING —P, OIL POCKET; P1, RETURN OIL GROOVE

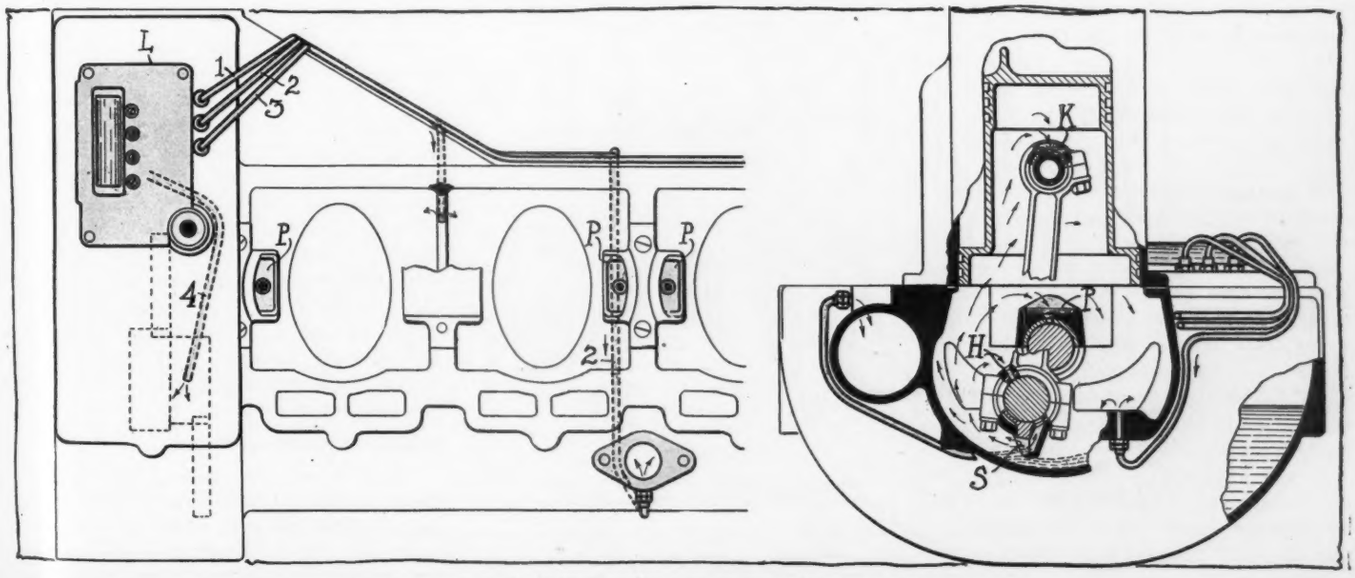


FIG. 5—ON TWO-CYCLE ELMORE OIL IS FED BY LEAD 2 INTO MIXTURE

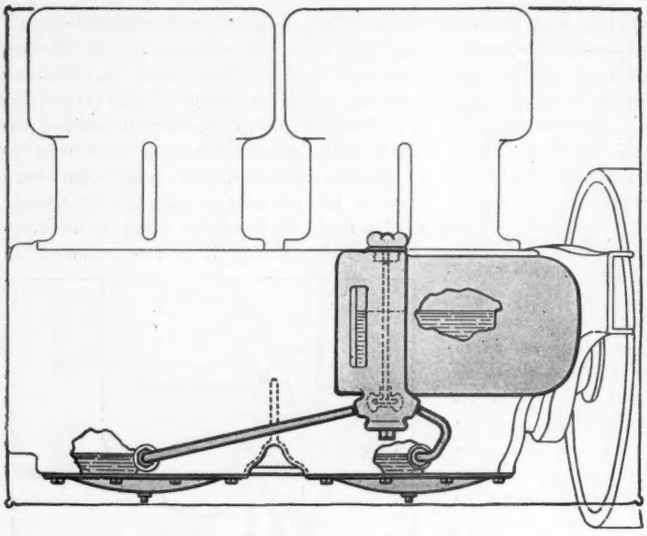


FIG. 6—THE E-M-F GRAVITY OILING DEVICE

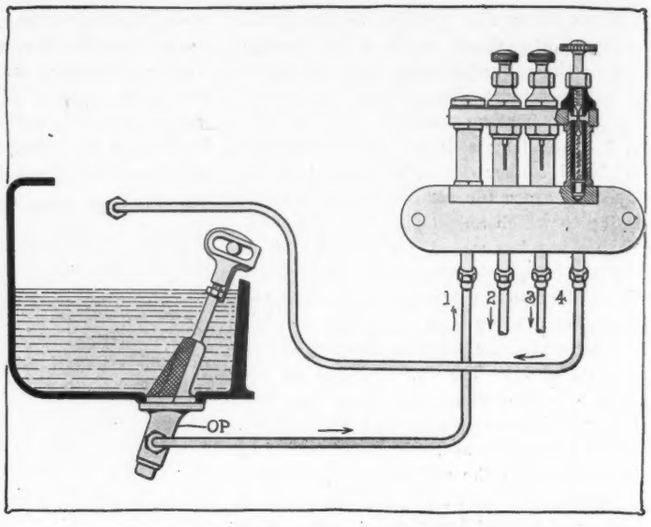


FIG. 7—NON-CIRCULATING TYPE ON WHITE 30

is reduced. In the Hupmobile system the top of each plunger carries adjusting nuts A. At the base is a glass sight feed G connecting with the oil delivery tube H. In the base of the oil tank is a drain plug S. Within the crankcase compartments a splash level is maintained with a drain cock in each compartment.

The E-M-F System.

The E-M-F gravity system is even simpler than that of the Hupmobile in that the splash level in the two crankcase compartments is entirely independent of the throttle opening but remains at a desired level no matter the speed at which the motor is operating. As Fig. 6 shows there is an oil tank of 1 gallon capacity on the base of the crankcase with two copper pipes leading to the crankcase compartments. The height on the side of the crankcase at which each pipe enters is the real feature in this system, because the ends of the pipes are open and the oil is free to flow whenever the level in the crankcase drops to the level of the pipe opening. In this way it is a simple gravity system, with nothing else to it. It is an old principle of mechanics that if a tank filled with liquid is higher than another one and a pipe connects them the liquid will only flow out of the upper one, providing it is air tight, when the end of the pipe in the lower one is uncovered. The E-M-F is an adaptation of this. For purposes of filling the oil tank there has to be inserted in the opening of the pipes leading to the crankcase a valve connected with the filler cap of the oil reservoir so that as soon as the cap is taken off the valve stops the oil flow, otherwise with the air entering the tank all of the oil would immediately flow to the case. There is accordingly a simple connection between the filler caps and these valves so that with the filler cap off the valve is shut and as soon as the filler cap is in place the oil pipes are opened. With this oiling system the same oil level is maintained irrespective of the crankshaft speed and should the motor be working very hard at a low speed the oil level remains constant because as soon as the lower end of the oil pipes become exposed air bubbles pass up into the oil tank and oil flows down. The same oiling system is used on the Flanders runabouts.

The Brush System

In the single-cylinder Brush runabout

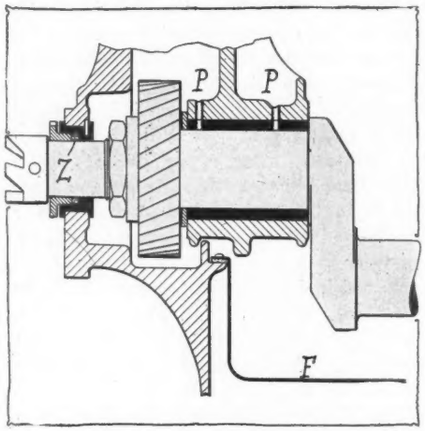


FIG. 8—NATIONAL DOUBLE OIL POCKETS ON CRANKSHAFT BEARING

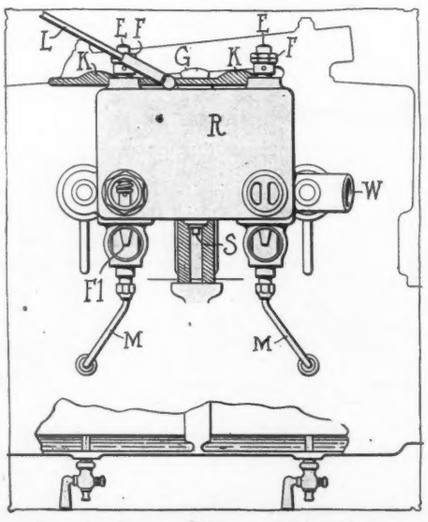


FIG. 9—GRAVITY OILER ON HUPMOBILE

motor a gravity oiling system is used. The oil flows through a sight feed on the dash into the crankcase at a point, Fig. 11, directly in rear of the nut on the connecting rod cap. This oil falls upon an A-shaped boss which divides it, sending part to the right and part to the left. That to the right flows into the cambox whence it lubricates the camshaft bearings, that to the left reaches the pocket P and flows through the duct D into the rear crankshaft bearing. A ring R in the bushing distributes it and collects all overflow and returns it to the crankcase through the duct DI. In the front crankshaft bearing a similar arrangement exists. A splash is maintained in the crankcase.

The lubrication system on the small White gasoline car is shown in Fig. 7. It is a non-circulating system, consisting of a reservoir in which is a plunger pump OP. The pump delivers the oil through a lead I to the sight feed on the dash. From this it flows through leads 2 and 3 to the crankcase compartments, and there is an overflow lead 4 direct to the oiler, in case the pump is delivering more oil than required by leads 2 and 3. In this motor the crankshaft is ingeniously drilled so that centrifugal force is utilized as much as possible in oiling the lower connecting rod bearings. The crankshaft in this motor is carried on two races of ball bearings, the oiling of which is a simple matter compared with plain bearings. In the large White gasoline car, recently brought out, the oil pump is placed on the opposite side of the motor to that used in the small car, and the oil tank is carried high on the front of the dash at the left side, where it is covered by the hood.

Peerless Two-Pump System

The Peerless oiling system, Fig. 14, carries a mechanical oiler located in the reservoir R at the left rear of the motor. This pump supplies oil direct through the lead 1 to a sight feed on the dash. From this

sight feed are two return pipes, 2 and 3, to the crankcase compartments, and another pipe 4, which is an overflow one leading back to the oil reservoir. The pipes 2 and 3 maintain the desired splash level within the crankcase. Should the crankcase level have to be increased a plunger pump P is furnished which by turning the plunger handle to indications marked, oil can be delivered direct through the pipes 5 and 6 to the front and rear cylinder compartments. To the right of this pump is the filler cap of the reservoir. A most commendable Peerless feature is the lever L by which the drain cocks in the bottom of the compartments can be opened or closed. This allows of determining the correct oil level without having to even dirty the hands. The small illustration in the lower right shows how this connects with a standpipe, giving the desired level for the splash. A drain plug is also shown in this illustration.

Royal Tourist Circulating

The Royal Tourist employs a circulating system, Fig. 13, in which the gear oil pump is located in the crankcase reservoir, which has a capacity of 2½ gallons. The pump delivers the oil, as indicated by the arrows, through the filter F and thence to the sight feed through one lead and to the three crankshaft bearings, the lead passing to one showing in the illustration. After being used in these bearings the oil is thrown off by centrifugal force into a catch C on the crankthrow cheek. From this catch a passage is drilled through the crankpin. It lubricates this bearing and then passes through a small tube up to the connecting rod to the wristpin. With this system there is a forced lubrication to the three crankshaft bearings and the upper and lower connecting rod bearings. A special oil lead B goes to the timing gear housing at the front of the motor, lubricating these gears with oil instead of

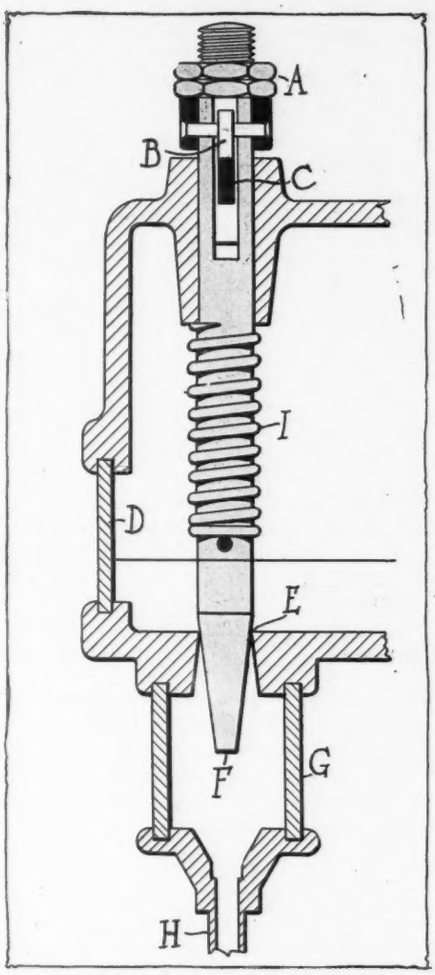


FIG. 10—DETAIL OF HUPMOBILE FEED

grease. In this oiling system a pressure gauge G is carried on the dash which shows the oil pressure at all times, and should the pressure get too high there is a safety valve which allows the oil to return direct to the timing gear housing. An extra supply of oil is carried in a 3-gallon chassis tank T. By a valve inserted in the line the crankcase supply can be replenished direct from this tank.

Ohio Crankcase Type

In the Ohio a vertical plunger pump, Fig. 12, is used, being worked by eccentric E on the camshaft. The top of the plunger pump plunger P carries a roller RL bearing against the eccentric. The plunger is forced down by the eccentric, but raised by a spring S. A splash is maintained into which the connecting rods dip; there is an oil indicator I carried on the float F; and a specially larger filler pipe FI. The reservoir R contains the screen z through which the oil is filtered.

New Premier System

The Premier cars employ a new circulating system with a gear pump which delivers to the troughs T, Fig. 17, into which the connecting rod scoops dip. The oil lead L from the pump is shown. Each connecting rod cap carries a scoop S and in the upper part of the bushing are two oil ducts that collect the splash. Above each crankshaft bearing are pockets P for the oil.

In the Selden motor, Fig. 16, one-half of each connecting rod cap carries a scoop which dips into a trough T. All of the oil used in the splash is carried in these troughs. The reservoir R is capacious. A gear oil pump located in the center of the crankcase at one side and driven off the timershaft is used.

The new Hudson monobloc motor uses a circulation system. As Fig. 15 shows, the plunger pump is driven by eccentric off the camshaft. It draws its supply from the base through a screen and delivers it through a single pipe to the rear end of the crankcase. At this point a T union divides the stream, part going to the forward end of the crankcase through the timing gears and part to the rear of the

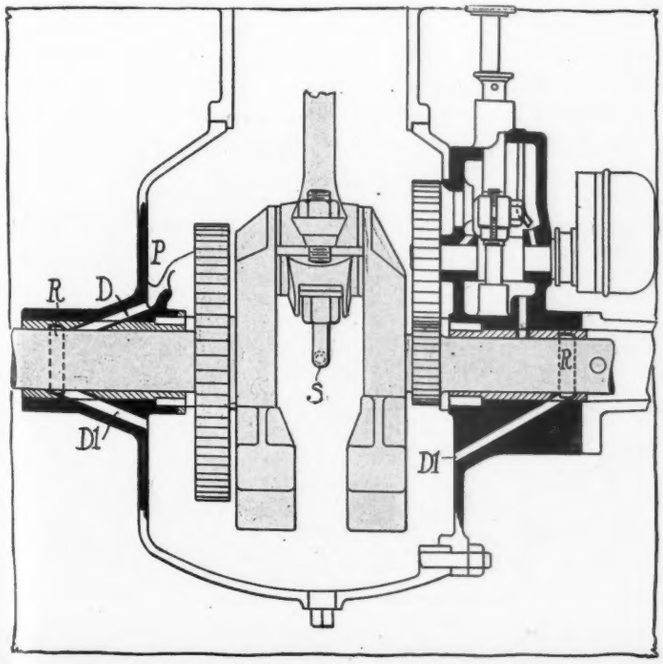


FIG. 11—GRAVITY SYSTEM OF OILING BRUSH MOTOR

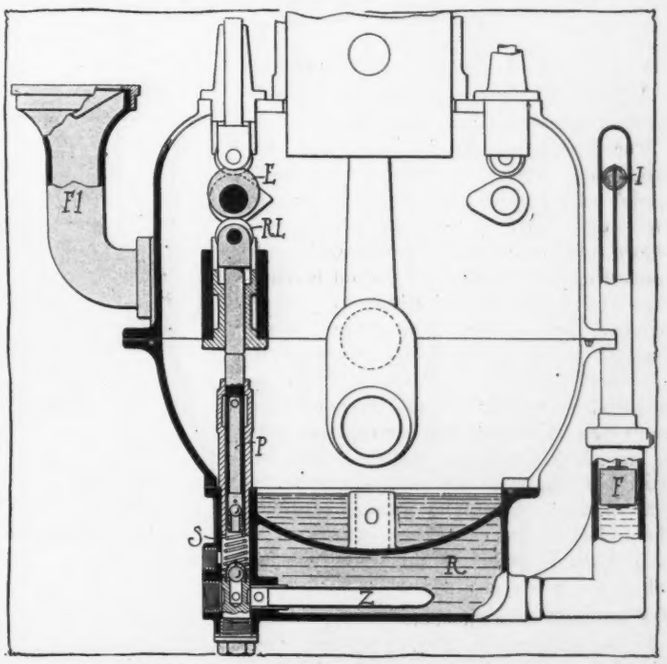


FIG. 12—CIRCULATING SYSTEM ON OHIO MOTOR

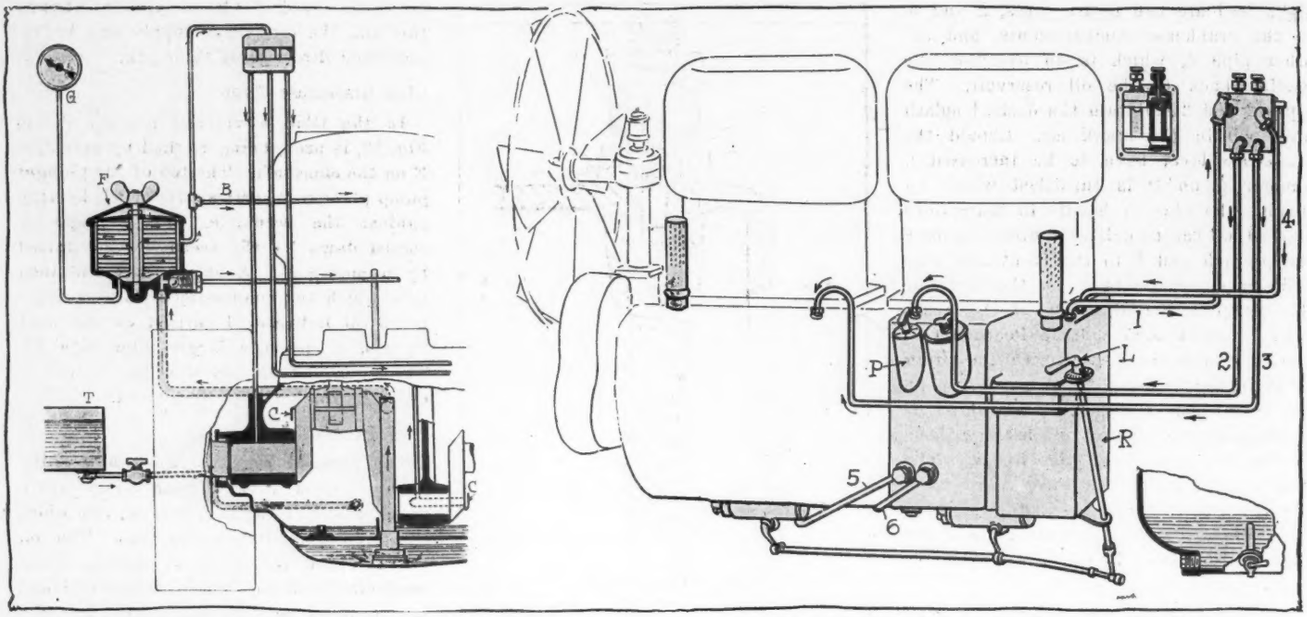


FIG. 13—ROYAL TOURIST CIRCULATING OILING SYSTEM

FIG. 14—NON-CIRCULATING SYSTEM ON PEERLESS MOTOR

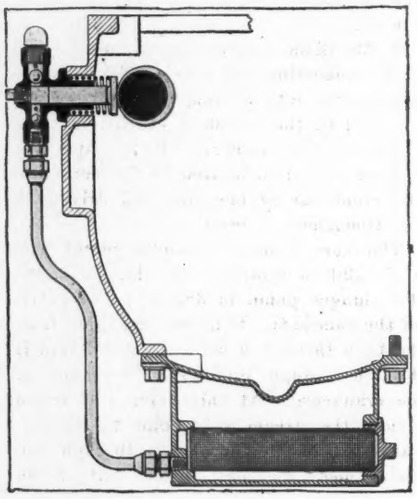


FIG 15—HUDSON'S PLUNGER OIL PUMP

case. Scoops are used on the connecting rod caps.

Locomobile Uses Circulating

The Locomobile uses a very improved circulating system on its new six-cylinder model. Its details appear in Fig. 18. In the upper part of the illustration are shown miniature troughs T into which the connecting rod scoops dip. The oil is delivered direct into these troughs from the oil pump. The overflow from these troughs goes direct to the reservoir. A commendable feature is that the screen Z can be removed by taking out the threaded plug on which it rests. The pump is outside of the crankcase and so easily dismounted. An oil indicator of the level in the reservoir is used, it being a float F carrying the indicator pointer I. By means of a plug directly under it this float can be taken out when desired.

The Midland Arrangements

In the Midland circulating system, Fig. 19, a splash is used, its proper level being maintained by overflow holes H. The pump OP elevates its oil into a horizontal lead L which has four branches, 1, 2, 3, 4, one to each cylinder compartment. The exact shape of the reservoir R is seen in the end section of the crankcase.

Chalmers Uses Plunger Pumps

Shadow photographs, Figs. 20 and 21, show the Chalmers' circulating system. A plunger pump worked from the camshaft is used in both models. These pumps lift the oil from the reservoirs, shown in shadow, forming the base of the crankcase, through sight feeds on the dash and from these it flows to the crankcase compartments where it supplies a splash. The connecting rods carry scoops. The crankshafts are not drilled.

There are many little details in connection with circulating oiling systems that are of more than passing interest. The Overland uses a circulating system on some models, and, Fig. 22, the oil from the pump OP passes through a lead L inside the crankcase to a groove V on the inside of the crankcase at the center of the motor. This divides the flow into halves, one going to the two front compartments of the crankcase and the other to the rear pair. Overflow pipes P are located in the crankcase compartments.

Corbin Introduces Circulating

The Corbin Company uses a non-splash circulating system, Fig. 23, in its new model. The reservoir R extends but half the length of the crankcase and in the crankcase proper there is not a vertical partition to maintain an oil pool into which each connecting rod can dip. The oil is fed direct from the oil pump through a lead L to a pipe extending horizontally the length of the crankcase and from this are branches L2 which lead to the three crankshaft bearings, and for convenience are marked 1, 2 and 3. The lead I supplies the lower connecting rod bear-

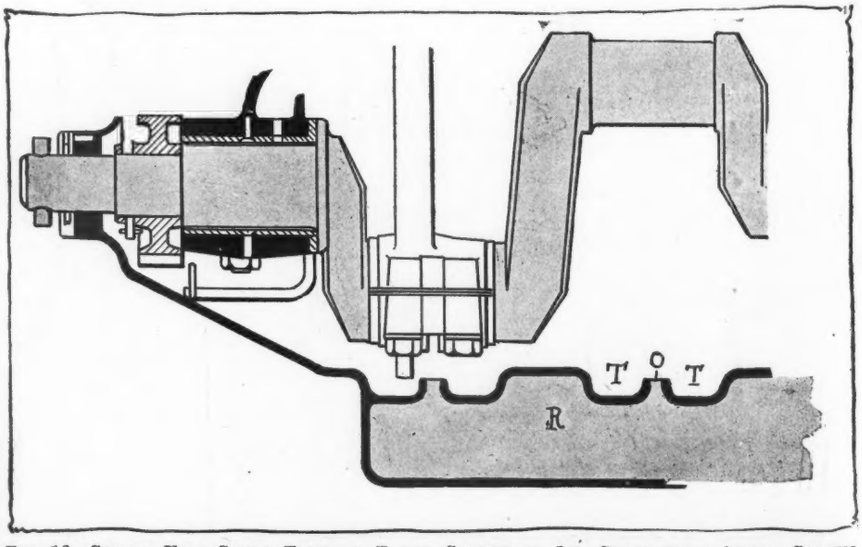


FIG. 16—SELDEN USES SMALL TROUGHS T FOR SPLASH IN ITS CIRCULATING OILING SYSTEM

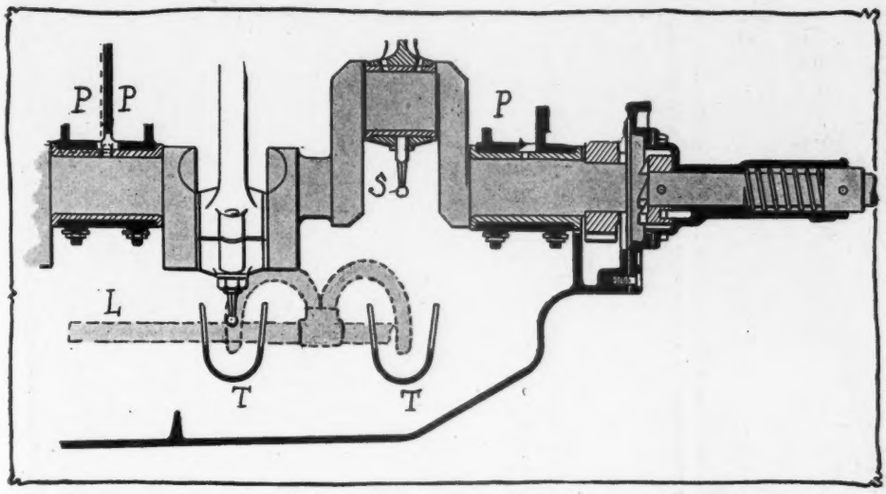


FIG. 17—THE NEW PREMIER CIRCULATING SYSTEM MAKES USE OF TROUGHS T INTO WHICH THE SCOOPS DIP

ings through the duct B drilled in the crankthrow cheek. The lead 2 supplies two connecting rods through ducts BI; and the lead 3 supplies one through the duct B2. The wrist pin bearings, the cylinder walls and the piston rings are oiled by the oil that is thrown off from the lower connecting rod bearings, there being ample throw-off from these because all of the oil must pass out through them, except what seeps out past the ends of the crankshaft bearings.

National Improves System

The National uses a comprehensive circulating system, Fig. 24, it being a splash system with scoops S on the connecting rod caps. But two overflow pipes are used to return the oil to the reservoir R, both joining in the general pipe P which empties directly into the cylindrical screen for purification of the oil. The oil pockets over the crankshaft bearings are illustrated; the timing gears operate in an oil bath and there is an indicator ball B to show the oil level, the indicator being carried on a float FI. The oil from the pump is sent direct through a lead LI to a sight feed F and returned through a lead L2 which delivers into a horizontal pipe L extending the length of the crankcase. Each connecting rod cap, in addition to having a scoop, has two openings cut in the top of the bearing to admit the splashed oil.

The Jackson affords an example of the pumpless circulation oiling system which has on several occasions been illustrated in these pages. The flywheel is the pump, it being enclosed in a compartment filled with oil. All are familiar with the grindstone used by the farmer which picks its supply of water out of a trough in which the lowest part of the stone is submerged. This is what the Jackson system does. The flywheel picks it up and carries it around on the periphery. But it is cut off, so to speak, by a shelf at the top of the wheel and led through a ⅜-inch pipe into the center of the crankcase, where it is divided equally between crankcase compartments 2 and 3. The splash of the connecting rods throw the oil into inclined troughs on the inside of the crankcase, the trough from No. 3 leading to compartment No. 4 and that from No. 2 leading to compartment No. 1. When the oil reaches the necessary level in all four compartments it is returned through pipes to the flywheel compartment, where it is ready to be recirculated.

Marmon System Complete

Perhaps no other concern has worked out the theory of circulating oil systems further than the Marmon company. This system has frequently been illustrated in these pages. An external gear pump delivers oil to the three crankshaft bearings. From these it is led through the drilled crankshaft to the lower connecting rods, and from these it is further led in de Dion fashion through pipes up the connecting rods to the wrist pin bearings. This gives positive oil pressure to all eleven of the main motor bearings. The oil reservoir contains a specially larger strainer. With this system Marmon cars have been driven over 1,000 miles in contests without having to add a drop of oil to the reservoir supply and the idea has been retained for this year.

Stoddard Within Crankcase

The Stoddard-Dayton circulating system differs from many others in that the gear pump delivers to a distributing manifold carried inside the crankcase and on the upper part of the case. From this manifold copper pipes lead to the three crankshaft bearings, and thence out of the bearing ends into eccentric oil rings on the crankshaft cheeks, these rings delivering into the crankpins through ducts. Other

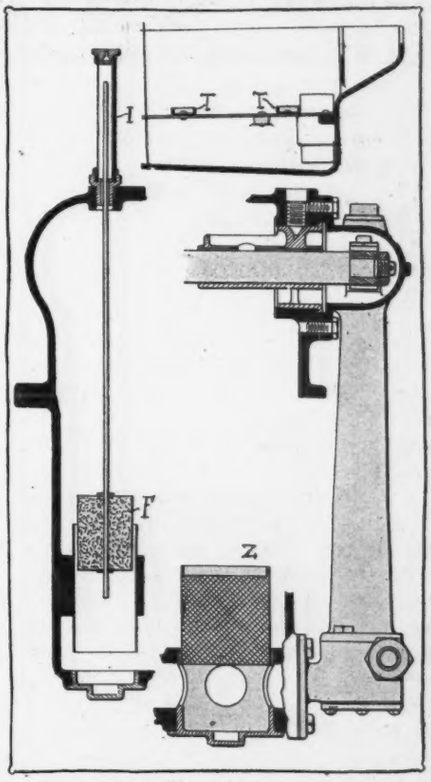


FIG. 18—OIL PUMP, OIL TROUGHS T, OIL FLOAT F, SCREEN Z, AND INDICATOR I IN LOCOMOBILE CIRCULATING OIL SYSTEM

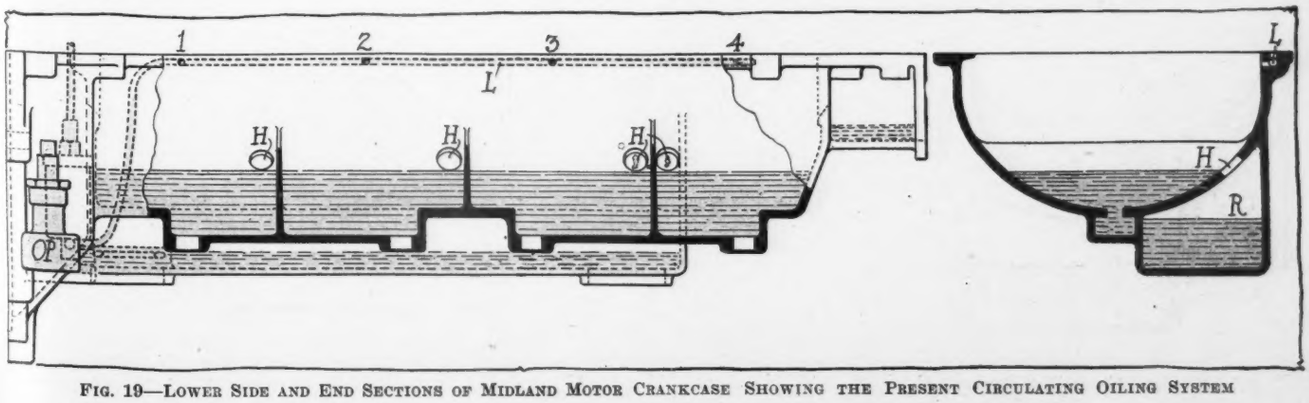
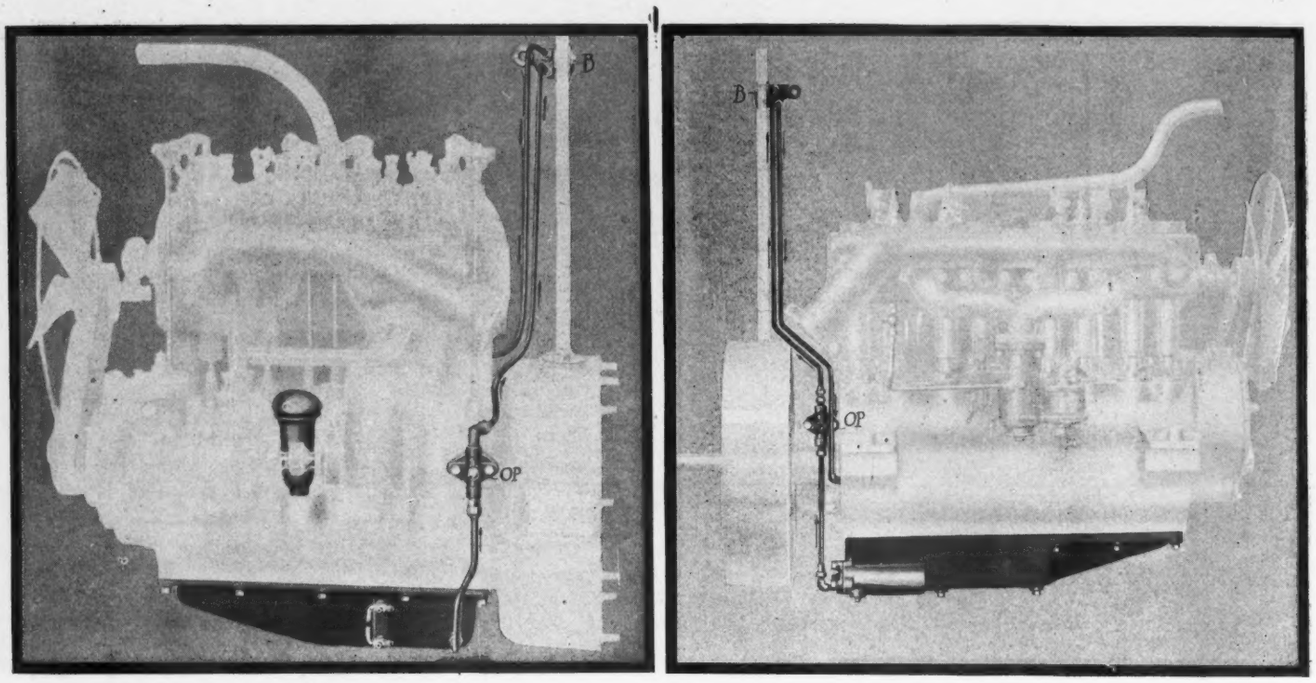


FIG. 19—LOWER SIDE AND END SECTIONS OF MIDLAND MOTOR CRANKCASE SHOWING THE PRESENT CIRCULATING OILING SYSTEM



FIGS. 20 AND 21—SHADOW PHOTOGRAPHIC REPRODUCTIONS OF CHALMERS 30 AND 40 SHOWING OILING PARTS IN BLACK

leads go to the camshaft bearings and to the timer-distributer shaft.

The Speedwell motor uses a pump circulation system, the oil flowing through a sight feed on the dash to the crankcase where it is divided between the front and rear compartments.

In the Matheson six a plunger pump is driven from the camshaft. It forces the oil through a sight feed on the dash to the timing gears at the front end and also to the three crankcase compartments. The overflow returns to the reservoir beneath the case.

In the Lambert monobloc motor a rotary oil pump is driven from the transverse shaft at the front of the motor which drives the magneto. This pump delivers the oil onto the timing gears at the front end and from these it overflows into the crankcase, forming splash levels. Each connecting rod cap carries a scoop and is also cut away to let the splashed oil into the bearing. The reservoir has 1½ gallons capacity.

In the Pullman the reservoir in the circulating system contains 3 gallons. A rotary pump lifts the oil into the four crankcase compartments. The level in each is independently adjusted by a lever outside the crankcase, controlling, as it does, a disk valve with a hole in it. By giving the valve a part rotation the overflow hole can be raised or lowered and so the oil level changed. Connecting rods carry scoops and have cut-away bearings in addition.

In the Haynes the gear pump draws the oil from the 2-gallon crankcase reservoir and, taking it through a sight feed on the dash, pumps it to a manifold within the crankcase which divides it into three parts, two to the crankcase compartments and one to the timing gears. There are two scoops on each connecting rod bearing. The overflow oil is screened twice before being returned to the reservoir.

In the Columbia motors a rotary pump takes the oil from the crankcase reservoir and delivers it to the three crankshaft bearings and to the timing gears.

Palmer & Singer Complete

In the Palmer and Singer circulating system a gear pump forces the oil through ducts integral with the crankcase direct to the main bearings of the crankshaft and camshaft. Separate oil leads supply the timing gears and cylinders and one pipe leads to a sight feed on the dash. Beneath the sight feed on the dash is a petcock which when turned off permits all of the oilers to work, with the exception of those to the cylinder walls. The splash is sufficient for the cylinder walls when in cities where smoking is to be avoided. For country use the petcock is turned on, allowing oil to flow direct to the cylinder walls. The crankcase has an oil indicator.

On the American the circulating oiling system of last year is continued, except that now all of the oil pipes are cast integrally with the crankcase. The crankcase reservoir contains 1½ gallons and there is a 2-gallon auxiliary tank carried on the chassis. The reservoir oil pump is located under the center bearing and is driven by worm from the camshaft. The pump delivers through a sight feed on the dash and thence to the crankshaft bearings and also to the cylinder walls, the openings

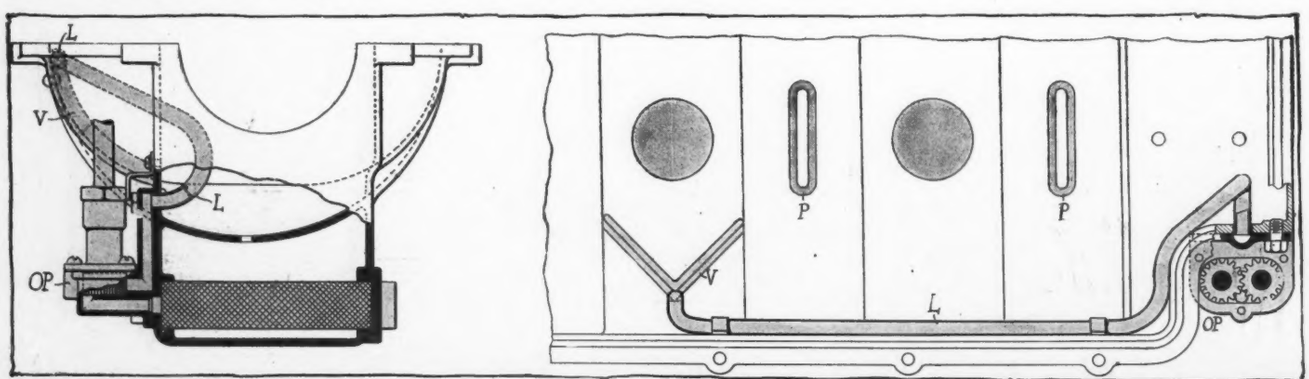


FIG. 22—IN THE OVERLAND CIRCULATING OILING SYSTEM THE PUMP OP DELIVERS THROUGH A LEAD L, WHICH POURS THE OIL ONTO A DIVIDER V IN THE CRANKCASE BASE

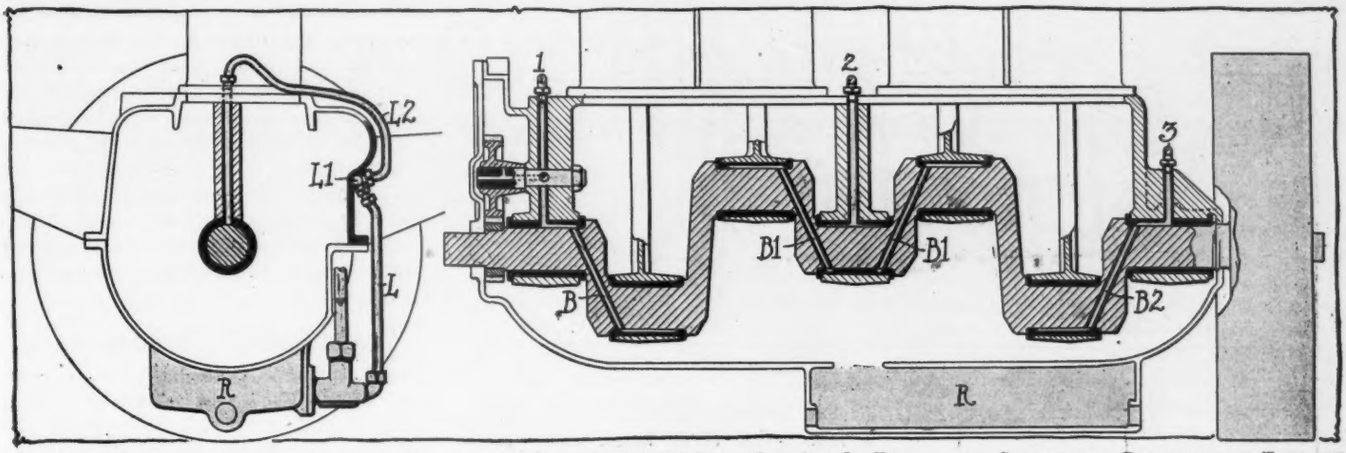


FIG. 23—CIRCULATING OILING SYSTEM ON NEW CORBIN WITH T-HEAD MOTOR. THE OIL IS FED TO THE CRANKSHAFT BEARINGS AND THROUGH THE DRILLED CRANKSHAFT TO THE CONNECTING RODS

in the cylinder walls being uncovered when the piston is at the top of the stroke.

On the two Stearns models a crankcase system is in vogue. The oil is fed to the four compartments of the crankcase, the oil feeding onto the lower ends of the connecting rods.

Alco Circulates Oil

In the Alco circulating system, Fig. 28, the oil pump is between the crankcase and the flywheel and draws its supply from the reservoir R through a screen S which guards the entrance of the lead L. The oil is forced by the pump to the crankshaft bearings and the crankshaft is drilled at L1 from the rear bearing to a connecting rod; from the center crankshaft bearing through two ducts L2; and from the front bearing to the connecting rod through the duct L3. A splash system is used, with adjustable overflow pipes so that the splash level can be adjusted.

Pope Double System

Fig. 26 gives a general conception of the double pump Pope-Hartford system. This is a circulating system in which there is a mechanical oiler M on the side of the crankcase and also a reservoir R in the base. The mechanical oiler M pumps the supply of oil through the four pipes to the four cylinder walls. There is in addition to these leads an overflow pipe B through which the oil flows by gravity to a camshaft compartment, where it lubricates the four bearings of the shaft as well as the tappet rollers and guides. This is practically the only motor in which the camshaft operates in a volume of oil like this. The overflow from this housing is led through holes so located as to always maintain a correct level in the camshaft chamber to each of the three crankshaft bearings. These bearings are also lubricated by splash, as there are suitable pockets above the bearings in which the splash collects. The final overflow from these bearings, as shown in Fig. 25, reaches the crankcase reservoir R. The oil is then lifted from this reservoir to the mechanical oiler by suction pump. The reservoir has 3-gallon capacity.

In the Mercer circulating system, Fig. 27, the method of driving the oil pump shaft through bevel gears from the camshaft is shown. In this system the scoop on the end of the connecting rod cap is not used so that the entire lower end of the connecting rod cap dips into the oil level, practically filling the entire compartment formed for the splash.

New Ideas in Carbureter Line at Show

(Continued from page 59.)

In this way the cylinders are left filled with a rich mixture; the other is the hot air pipe, P, for the warm air supply.

The Locomobile on its new carbureter, used on its four and six-cylinder models, employes a device that accomplishes the same results. The auxiliary valve is controlled by two springs, as is the Franklin, and this tension can be changed from the dash.

There are two examples in the garden of facilitating starting, both of which were referred to in last week's issue. One is the priming system that is stock on all Pierce-Arrow cars. It is a plunger pump on the dash which is piped from the gasoline line to the intake manifold. One stroke of the plunger injects enough gasoline through a four-opening nozzle in the manifold to make starting easy.

The Elmore is the other example. It carries a small gasoline tank on the dash under the hood and it is piped to the priming cups on the cylinder heads. All of the priming cups are connected by a horizontal rod passing over the cylinder heads and through the dash. This rod has a linkage with the gasoline valve in the tank. Pulling the rod opens the priming cups and also the gasoline valve, allow-

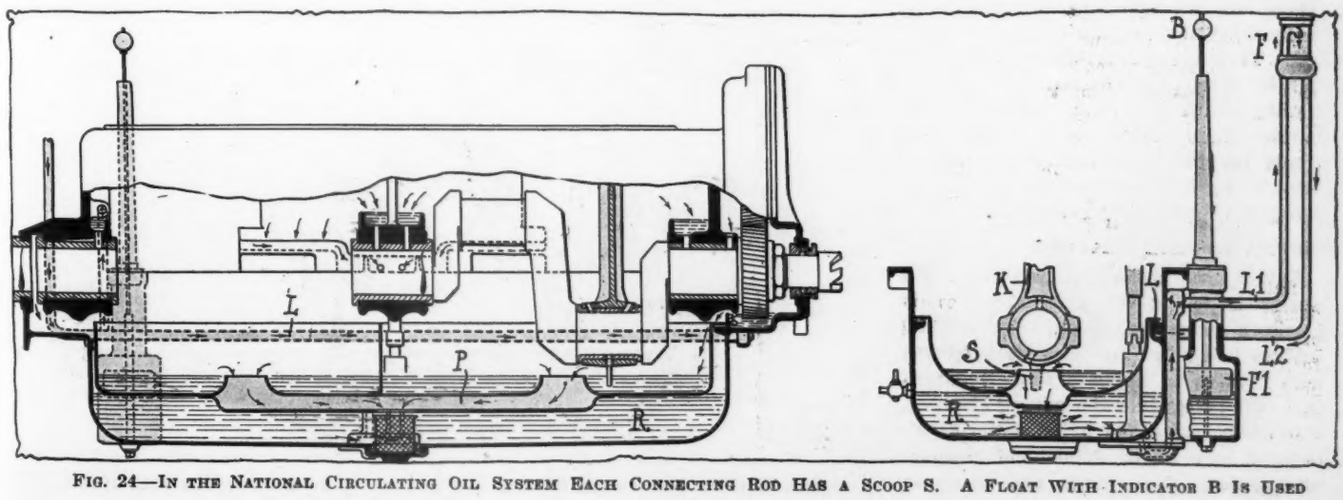


FIG. 24—IN THE NATIONAL CIRCULATING OIL SYSTEM EACH CONNECTING ROD HAS A SCOOP S. A FLOAT WITH INDICATOR B IS USED

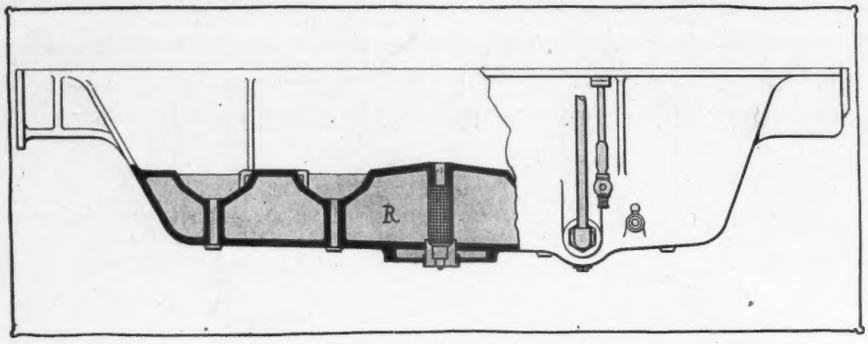


FIG. 25—THE POPE-HARTFORD CRANKCASE

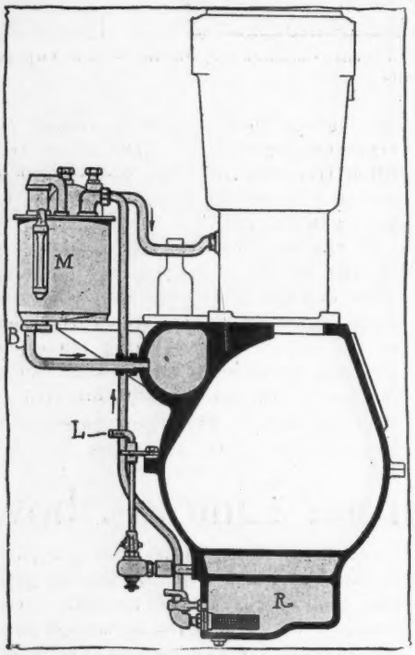


FIG. 26—END SECTION OF POPE-HARTFORD MOTOR SHOWING DOUBLE-PUMP SYSTEM

ing gasoline to flow into all of the cylinders.

In conclusion, the fact must not be overlooked that water-jacketing has become a recognized feature of carburation. It is now an accepted fact that the gasoline flow must be regulated out of the nozzle, either by using two or more nozzles, using auxiliary air valves or some other means. There has not been any stampede to or away from the concentric type of carbureter. Those concerns making the float chamber in a separate compartment are continuing it and vice versa. The many carbureter improvements tell in unmistakable words the fact that carbureter improvement is needed and that the makers are doing their best to bring it about.

Stewart Precision Carbureter

Rather an unconventional carbureter design is to be found in the Stewart precision carbureter, its only conventional feature being the use of a float feed, a needle valve to regulate the amount of fuel that passes into the mixing chamber, a butterfly valve and a hot waterjacket. It is a very small, simple and compact construction. No springs are used. It has no spraying nozzle, but uses instead a tube many times larger than the required capacity. The initial air is absolutely constant and not adjustable and all the air enters at one point, so that there is no so-called auxiliary air intake. The air valve forms the only moving part in the carbureter.

DRAW FOR TRUCK SPACE

Omaha, Neb., Jan. 7—A meeting of the men who will exhibit motor trucks at the sixth annual show of the Omaha Dealers' Association was held last week, and spaces for exhibiting their trucks drawn for. Because there is not room enough on the main floor, the trucks will be exhibited in the auditorium basement. The Murphy company will exhibit several Frayer-Miller trucks; the Electric Garage Co., two Packard trucks; the Johnson-Danforth Co., Avery trucks; the Nebraska Buick Co., Buick trucks, and the T. J. Northwall Co., a Brush delivery wagon. Others also will probably exhibit. The directors of the association are having hard work trying to find room enough for all of the dealers who want to exhibit. There have been many pleas from outside factories for space, but these have all had to be turned down from lack of space.

CINCINNATI SPACE IN DEMAND

Cincinnati, O., Jan. 9—The initial drawing for space at the fourth annual Cincinnati show, to be held during the week of February 20-25 by the Cincinnati Automobile Dealers' Association, with the cooperation of the Automobile Club of Cincinnati, indicates that the show will be far greater in size and scope than any previous exhibition. The demand for space was much greater than expected, 31,611 feet being allowed the thirty-nine exhibitors, although more than 40,000 feet was in request. The commercial car exhibits will be made in the main hall. It is planned to provide additional space to that already assigned for accessories, if possible.

CASE WINNER OF ROAD RACE

Phoenix, Ariz., Jan. 3—A Case car driven by F. W. Brong, won the Phoenix-Tucson road race which finished in Tucson Sunday. Brong put his car through in 3 hours and 45 minutes, the distance being 120 miles. Joe Green in a Hudson was second and a Pope was third. The Pope played in hard luck in that it was struck in the mud in the Santa Cruz river when it was 30 minutes to the good. An Elmore, driven by Roland Norris, turned turtle.

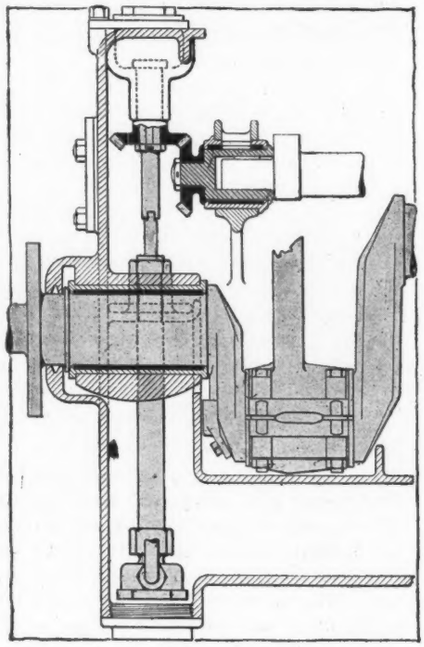


FIG. 27—THE MERCER CIRCULATING OILING SYSTEM

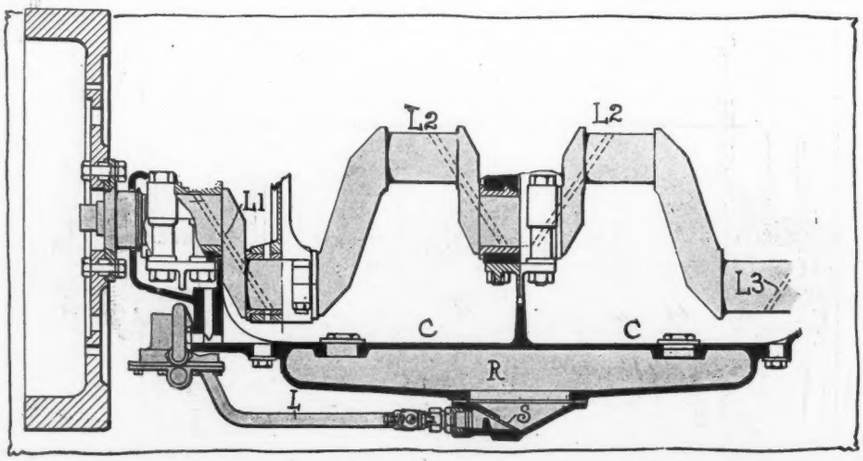


FIG. 28—THE CIRCULATING SYSTEM AND DRILLED CRANKSHAFT ON THE ALCO MOTOR

Motor Car Repair Shop

Hints for the Amateur

CLEANLINESS, in the motor car repair shop is almost as important a factor as regards the efficiency of the work performed therein, as it is in the operating room of a hospital. This is a fact that has been fully realized and given due consideration in most of the up-to-date shops; and, in many, very excellent and often very expensive arrangements have been provided for the purpose of facilitating the cleaning of motor car mechanisms. There was a time, when the wash rack and a small can of gasoline and a brush, perhaps, was all there was in the way of facilities for cleaning the old grease off of parts requiring inspection and repair, and there are many shops today that can boast of nothing better.

There are many in charge of motor car repair shops that do not realize that enough gasoline and waste can be wasted in the process of cleaning up the parts of a single car, during its overhauling, to pay for the cost of a very economical and efficient trough or basin.

It is still customary in many shops, for the repairman to take a rear axle back onto the wash rack and dis-assemble it. The grease therein is littered all over the rack and afterwards washed off into the drain pipe, requiring the services of a catch-basin cleaner or plumber about once a month, at the rate of about $2 per cleaning, when his services otherwise should not be needed but once or twice a year. When the working parts of the axle have been removed, a thorough cleaning with gasoline usually follows in which from 1 to 3 or 4 gallons of gasoline also passes into the catch basin. Often the bevel-gear and differential unit is rested on a pail containing a couple of gallons of gasoline to facilitate its cleaning, and during the operation the whole outfit topples over, with consequent loss of the gasoline and possible damage to the mechanism.

At the left in Fig. 1, is shown a wooden tub used for washing parts in one of the best equipped repair shops in the city of Chicago. It is lined with tin, generally contains a supply of gasoline of a depth indicated by the dotted lines, and is provided with a plug P in the bottom so that it may be drained when the cleaning fluid becomes excessively dirty. Several gallons of gasoline with this sort of a trough, is adequate for cleaning all the parts of a number of cars. In connection with this tub, the ease and efficiency of cleaning is promoted by the use of the brush U and the velvet rag O. There are many foremen who are too economical to buy a brush for 35 cents every 3 months, but allow their workmen to use up several dollars worth of waste instead with less convenience and effectiveness. Of all styles of brushes the dauber shown in the illustration is about the best for general purposes. A velvet rag is specified because it is one of the least liable to shed lint or fibres that later on may interfere with the proper fitting of the parts. There are cheaper clothes, however, that are just as good. In one of the largest gas and gasoline motor and motor car factories in Germany, where economy in every detail is scientifically considered, every mechanic is supplied with a couple of sets of clothes for the purpose of cleaning the parts of mechanisms upon which he works. Every week one of these sets of clothes is collected and laundried. They are of a durable material that is free from lint and are about the size of a large napkin.

The Packard branch in Chicago has one of the best equipped repair departments in the city, and in the upper and lower right hand portions of Fig. I, are shown some of the simple contrivances in constant use therein. The lifting jack, upper right portion, is of the utmost simplicity and when an operation is to be performed on the axles, brakes or wheels of a car, one man raises the handle H, slips the recessed portion R under a suitable part of the axle, presses down on the handle, and holds it down till another workman slips a stand B into place and the axle is let down upon it. The other end of the axle is raised and supported in the same way, and the whole operation consumes less than a minute of time. The standard B is a substantial structure with a slot S in the top of it for the clearance of truss rods when used under cars that are fitted with them. Another shop uses a set of blocks as shown at K for the purpose of supporting axles, car frames and the like; they are T-shaped, adapted to many uses, and an adjustable height is obtained by using a greater or lesser number of blocks.

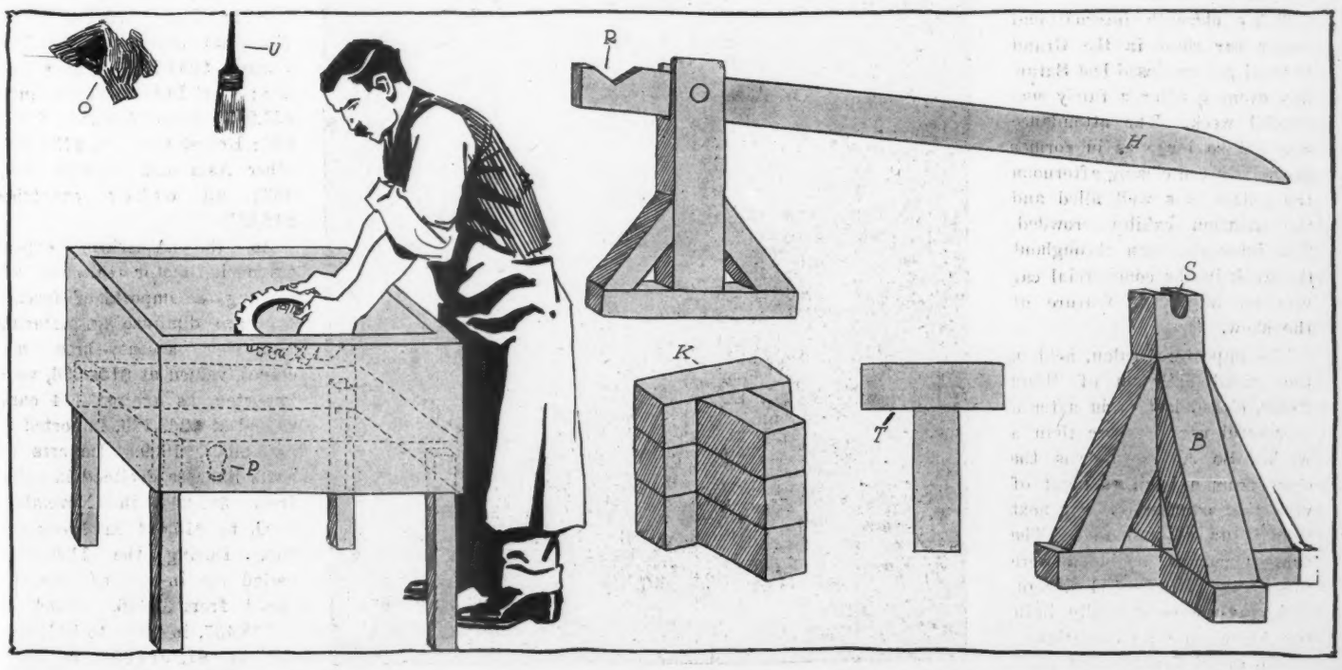


FIG. 1—SHOWING A NUMBER OF USEFUL FEATURES OF REPAIR-SHOP EQUIPMENT THAT EVERY SHOP SHOULD POSSESS

Engineers Holding Annual Session

Henry Souther Elected President of Society Succeeding Howard Coffin—Grand Central Palace Show Closes After Fairly Successful Week—Importers' Salon Attracts a Big Crowd

NEW YORK, Jan. 11—Special telegram—The annual meeting of the Society of Automobile Engineers, which opened in the Automobile Club of America here today, promises to be the greatest in the history of the association. The membership is now over 600, having been almost trebled during the year, and as a result, the enthusiasm is at the highest mark. The result of the election held this morning shows that Henry Souther is president for the coming year succeeding Howard Coffin, whose energies have done so much to put the society in its present position. Three new directors were chosen for a 2-year term, these being Howard Marmon, Henry May and Charles D. Davis. A. H. Whiting was reëlected treasurer and Coker F. Clarkson will be continued as general manager.

Besides the election this afternoon, the various amendments submitted by a special committee were thrashed over and will be voted on by a mail vote of the membership. One big question is what shall constitute eligibility for membership in the different grades.

During the afternoon the first session of reading of papers on standardization began. This evening the annual dinner of the society takes place, and it promises to be a record-breaker, more than 300 tickets having been sold.

The eleventh international motor car show in the Grand Central palace closed last Saturday evening after a fairly successful week. The attendance was not so large as in former years. On the closing afternoon the palace was well filled and the aviation exhibit crowded. The interest shown throughout the week in the commercial car was an important feature of the show.

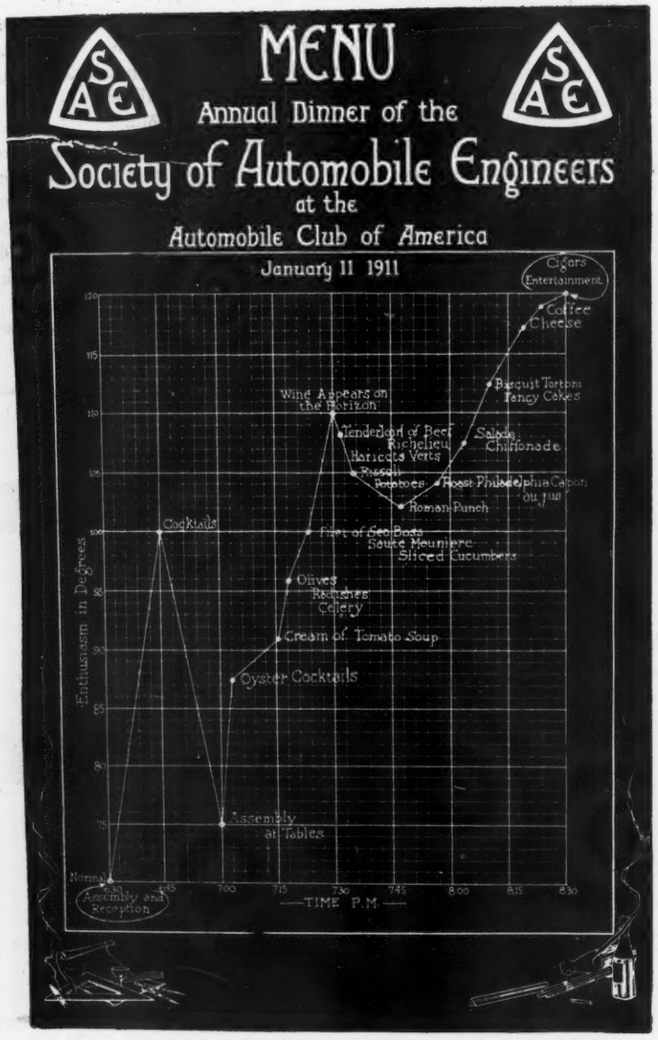
The importers' salon, held in the grand ballroom of Hotel Astor, closed last night after a successful run of more than a week. So successful was the show from a business point of view that another one for next year is an assured fact. The foreign models displayed were practically all of 1911 design, and many were specially built for American road conditions.

The social functions of show week opened last night with a theater party given by the Monogram Oil Co. at the Globe theater. Practically all of the big racing drivers were present, and after the show they assembled on the stage and presented Fred Wagner, the well known starter, with a loving cup. Among the drivers present were Grant, Mulford, Bruce-Brown, Bragg, Aitken, Robertson, Cobe and the Chevrolet brothers.

Tonight a testimonial dinner is being given by some of the press to Samuel A. Miles, general manager of the National Association of Automobile Manufacturers, and to Joseph E. G. Ryan, of Chicago.

MARYLAND AFTER TAG FEES

Washington, D. C., Jan. 10—Acting under instructions from Motor Vehicle Commissioner George, of Maryland, counties adjacent to Washington are making wholesale arrests of motorists operating machines without the 1911 Maryland license. In the dragnet thrown out Sunday, Vice-President Sherman was caught, together with about twenty-five other motorists. He was permitted to go, owing to his official position, but all others were forced to leave $25 with the sheriff to guarantee their appearance in court.



MENU AT SOCIETY OF AUTOMOBILE ENGINEERS' DINNER

EXPORTS AND IMPORTS

Washington, D. C., Jan. 7—The export trade in motor cars and parts continues to grow by leaps and bounds. The latest returns show that during November 675 cars, valued at $818,054, were shipped abroad, together with $134,649 worth of parts. The number exported in November a year ago was 464, valued at $464,567, while the parts exported were valued at $99,389. During the 11 months of 1910, the total number of machines exported was 7,683, valued at $10,339,905, together with parts valued at $1,804,430, giving a grand total of $12,144,341 for the 11 months' period. During the corresponding period of 1909 the number of cars shipped to foreign countries was 4,228, valued at $6,385,600, while the value of the parts exported was $800,982, making a total of $7,186,582 for the 11 months of 1909. A gain of $5,000,000 in our motor car trade within a year is thus indicated by the above figures.

The shipments of cars during November last were as follows: United Kingdom, $141,133; France, $39,770; Germany, $7,131; Italy, $9,593; other European countries, $102,583; Canada, $258,715; Mexico, $65,618; West Indies and Bermuda, $31,949; South America, $111,256; British Oceania, $134,956; other Asia and Oceania, $33,166; all other countries, $16,833.

As the American export trade in motor cars is advancing the imports of foreign cars are diminishing. During November seventy-three machines, valued at $152,596, were imported, as against 144 cars, valued at $269,186, imported in November, 1909. Imports of parts likewise declined in value from $62,240 in November, 1909, to $15,634 in November last. During the 11-months period the import of cars declined from 1,496, valued at $2,778,457, in 1909, to 941, valued at $1,901,655, in 1910. During these periods the im-

ports of parts, not including tires, decreased from $802,595 to $630,823.

The imports of cars during November were as follows: United Kingdom, thirteen, valued at $26,206; France, thirty-one, valued at $66,718; Germany, sixteen, valued at $29,824; Italy, eight, valued at $17,969; other countries, five, valued at $11,879.

UNCLE SAM STARTS RIGHT

Washington, D. C., Jan. 9—Universal lights are now the order of the day in the capital of the United States. Beginning January 1, the regulation requiring lights on all horse vehicles will be strictly enforced. The regulation provides that every private vehicle, between ½ hour after sunset and 1 a. m., shall display a white light, visible for a distance of at least 200 feet from the front, sides and rear. The regulation will not apply to vehicles belated by accident not more than 1½ hours after sunset, and en route to their stables at a pace not faster than a walk. Business wagons will also be required to have a metal tag on the right side, with the license number 3½ inches high, visible at least 20 feet. The tags will cost 50 cents each and must be obtained from the district permit clerk. Violation of either regulation is punishable by either fine or imprisonment The regulations will be tested in the courts, a decision to this effect having been made by the Team Owners' Association.

OHIO REACHES COAST

Los Angeles, Cal., Jan. 9—Bound up the coast on the final leg of its tour from New York to San Francisco, the Ohio pathfinding car is reeling off the last of the 4,500 miles of its run. It is expected to reach its destination Wednesday night, when it will have accomplished a long felt desire of eastern motorists, the establishment of a winter route between the coasts. Aside from the achievement of the car in having completed this long journey without breakage or serious mishap, the pathfinders have succeeded in creating a widespread sentiment for good roads in the sixteen states through which they have passed. They have the assurance of the executives of these states that the good road work will be pushed to the limit and later a petition, one of the objects the Ohio car pathfinders sought to accomplish, will be sent to congress urging the creation of a national highway from coast to coast. While in Los Angeles the pathfinders were the guests of the Automobile Club of Southern California. At the invitation of President Hilman they took advantage of their stay to rest up from the strenuous work of crossing the Colorado river desert from Phoenix, the most dreaded part of the coast to coast journey.

Chicago-New York Truck Run Carded

Chicago Motor Club Plans a National Test for July in Addition to Four Other Fixtures—Bids Received for the Parry Plant—Weed Chain Tire Grip Co. Makes a Statement

CHICAGO, Jan. 5—The Chicago Motor Club is undertaking the promotion of the most strenuous reliability run for commercial motor vehicles that ever has been attempted in this country—a trip from Chicago to New York, in which an effort will be made not only to demonstrate the road efficiency of both trucks and light delivery wagons, but also to show conclusively the cost of operation. As yet the plans are in an embryonic state, but within a week or so the technical committee of the club will compile the rules that will govern what might be called the national commercial motor vehicle test. The contest commitee of the Chicago Motor Club settled upon this big event at its meeting today, when it outlined its plans for the coming season. It was settled that the truck run should be held in July, probably the latter part of the month, when the roads are the best, and that the affair should be spread over 10 days, with the business machines being called upon to run at least 100 miles a day. The pace will be easy, approximately 10 miles an hour, which, it is figured, will be easy for all of the contestants in the run.

In addition to the truck contest, the club also announced four other big events, all of them repetitions of contests held during 1910. The season will open with a fuel economy run for pleasure vehicles in May; then will come the annual hill-climb at Algonquin in June, the truck endurance run will take place in July, and in August the national stock chassis road races will be run at Elgin. The 1,000-mile reliability run for pleasure cars, which has been a fixture of the local organization for the last 4 years, will be put on in September. It is the intention of the club to have the dates definitely set and the entry blanks out in time for circulation at the Chicago show. At that time entries for the various events will be received upon payment of 50 per cent of the fees, the balance to be paid 30 days prior to each contest. This is to give the makers a chance to get considerable early publicity.

BIDS FOR PARRY PLANT

Indianapolis, Ind., Jan. 10—Under the order of Judge Vinson Carter of superior court, the Union Trust Co., receiver, today received bids for the sale of the property of the Parry Automobile Co. There was but one bidder, a bid of $50,000 being submitted by W. K. Bromley of this city and G. O. Simon, Dayton, O. This offer doubtless will be approved by the court and the property will pass into the hands of interests represented by Bromley and Simon, it is believed in Indianapolis.

The bidders represented a syndicate composed of new capital and the principal creditors of the Parry company. Smaller creditors were asked to join in the purchase, but declined to do so. A new company will be organized at once, and will be incorporated. A name for the new concern has not been decided upon.

It is stated that at least $150,000 in working capital will be put into the company as soon as arrangements can be made to resume operations in the plant. No one identified with the Parry company will be interested in the new concern, it is said. While a name for the car to be manufactured has not been decided on definitely, it is stated the car may be known as the New Parry. It is the intention to manufacture 1,000 cars for the 1911 season.

Mr. Bromley has been prominent in local business affairs in the grocery and real estate business. Mr. Simon is an experienced motor car man, having been identified with a motor car company in Dayton. He will become general manager of the new company.

The court fixed $50,000 as the minimum bid to be received, and there was some surprise that more than one bid was not submitted.

WEED COMPANY STATEMENT

New York, Jan. 7—The Weed Chain Tire Grip Co. has issued the following statement regarding the recent decision as to the validity of the tire chain patent:

"Believing that in reaching its decision the court overlooked certain important facts, which when brought to its attention will result in a decision in our favor, we are asking for a rehearing of the case. The Excelsior decision is not conclusive against other manufacturers of unlicensed chain grips in other circuits. We are advised that in view of favorable decisions in other circuits our ultimate success in such courts is probable and we therefore are rapidly prosecuting to conclusion other cases now pending, and at the first opportunity will carry the litigation to the supreme court of the United States for final adjudication. The litigation generally has therefore not been concluded and until we have tested our Parson patent in other courts, as well as other patents controlled by us, we ask the trade to respect our position and decline to handle unlicensed grips. We shall continue to protect the price of stocks in the hands of our dealers and will adjust list prices and discounts from time to time as improved facilities permit."

Motor Sport in America in Need of National Racing Circuit

Second Vice-President of Long Island Parkway Discusses Problem, Holding that Such a Schedule Will Give Each Section Its Requisite Quota of Events and Star Drivers

By A. R. Pardington

NEW YORK, Jan. 7—The motor racing season just closed has demonstrated several things. Among them is the need for a regular circuit regulated by the national controlling body, the American Automobile Association, through its most efficient contest board.

From coast to coast the sport has been most enthusiastically patronized by the manufacturer, the public and by promoters of track and road contests. There have been some evidences on the part of promoters to satiate rather than satisfy the public appetite for speed and endurance. The time seems ripe for the organization of a national circuit which will provide sport in all parts of the country at seasonable periods. The owners of speedways, like Indianapolis and Atlanta, men who by their works have demonstrated their ultimate faith in the permanency of the sport, are entitled not only to credit but to the greatest consideration. The Long Island motor parkway promoters, men who have expressed their belief in the demands of the public for a specially constructed highway, set apart for the use of pleasure motor cars, and the builders of the Los Angeles motordrome, also a factor of importance in the sport, are entitled to have their particular needs considered, in the one instance as promoters of long distance road events, and in the other for track events of varying distances.

Conflict of Dates

Conflict of dates, although infrequent and apparently not preventable, under existing conditions would be entirely eliminated, and the non-appearance of contestants would no longer require to be excused because of overlapping of dates, or too short time allowed to leave one and arrive at another city. Probably no one matter has given promoters and officials more cause for work and exercise of judgment and authority than the failure of entrants to compete after being declared and duly entered.

Included in this circuit would be regularly licensed 1-mile tracks, specially constructed motordromes and speedways, road contests and hill-climbs. An equitable assignment of dates could be made, allowing ample time for loading, shipping, unloading and tuning up, after one date and in advance of the other. Many features, spectacular, economical and helpful, naturally would result. What more natural than a special train transporting cars, drivers, mechanics, meet officials, timers and timing device, etc., would very quickly follow? The direct advertising benefits following the progress of this train from Boston to San Francisco, from Detroit to New Orleans, with stops in New York, Philadelphia, Indianapolis, Atlanta, Chicago and many other cities, would be incalculable. The percentage of wins and losses of each car and driver daily announced to the press would soon arouse the individual interest of the public as does the publication of the baseball score today.

More Personality Needed

One fault with our general scheme of motor car racing has been a failure to introduce more of the personal element of the drivers. How long after this circuit had been on the road do you think it would take to have nearly every sport-loving person in Indianapolis studying the daily papers to see Johnny Aitken's or Joe Dawson's score? Harry Grant's wins and losses would be daily watched by his admirers here in New York and in New England. Bert Dingley has a host of friends on the coast, and Joe Matson has them everywhere. These, and dozens of others, all good men and fearless, are the ones who are making the sport what it is, and are entitled to the greatest possible credit. While it is true that the manufacturer must come in for his praise and publicity, the combination of car and driver is to be considered as a unit, with the preference, if any, in favor of the cool-headed driver, in whose hands a car either makes good or does not.

The economy to the manufacturer of participating in and becoming a part of such a circuit is worthy of pause and thought. One western manufacturer, who has raced successfully during this season and in 1909, assured me that he could see a saving to himself in such a circuit and special team of no less than $15,000 for the season. Given the same amount to expend, as under the present conditions, would mean a larger team, greater chances of winning and more advertising, or the same as in 1909 and 1910, and $15,000 for the factory or general publicity.

Enforcing the Rules

Racing, under the national circuit idea, would make it possible to have uniformity in the enforcement of the contest rules. Today in one city a lax referee or an inefficient technical committee is encountered, while tomorrow the officials may be strict to the letter. With a uniform board of officials, entirely disinterested, except as to the interpretation of rules and their application, would mean that a win today could be compared with one tomorrow. The same timing officials and the same timing device, accurate, whether on the track or road, would be of distinct advantage alike to the maker, the driver, the press and the public. The corps of officials needed would be small but effective, making the skeleton organization around which the promoter at Roaring Gulch or Painted Post could hang a string of officials, warranted to gladden the hearts of the local community and insure proper recognition to "our mayor" or some of "our leading citizens." Nothing that can immediately affect the winnings of the manufacturer or the driver, or that can influence the accuracy or authenticity of the recorded times, should be left to chance or to chance officials.

The publicity following each race would be authentic and above all suspicion. Facts, so embellished as to make the skeleton for longer stories, would mean much to all parties at interest. When a Smith-Brown car won or failed to win, no attempt to show that it was a Brown car that won or lost in its class. If a track was at fault, resulting in accident, no story to the effect that the midget car left the track, turned over fourteen times and buried its nose in the ground because its steering gear broke, when every one knows that the Midget steering gear is of all kinds of "ized" steel and would stand the shock of doom's day. If Larry Newfield failed to break the world's record it would not be because the watches all stopped or failed to agree, or because his fiery, untamed Purple Elephant turned on him and kicked him when he was not looking. No fake story or false statement would find its way to the wires or the correspondents—that is, at the time.

Racing Teams Suggested

As a stronger stimulus to the interest of the public, teams representing cities and speedways would prove an attraction. A Detroit team, for instance, made up of cars built in Detroit in addition to the regular manufacturers' teams from that city, would tend to introduce an element of sport and interest which would be a valuable asset to the promoter, whether east or west. Rooters everywhere are what are needed. Personal equation must be a factor in the calculation.

Motor car racing in this country is on a high plane, thanks to the contest board of the A. A. A. and the strong moral support given it by the Manufacturers' Contest Association. These two bodies, coöperating, have demonstrated a contract that is sane and absolute. So long as there are adventurers and persons who abhor contract and government, there will be talk of outlaws and outlaw meets. This class of gentry need not be taken seriously. They must be met and dealt with as was one within the past 3 months. The public likes clean, pure sport. Generally speak-

Detroit Space all Gone so Overflow Show Will be Held

Those Who Cannot be Accomodated in Wayne Pavilion will Have Chance to Display Their Products in New Main Building of Regal Company—Gossip of the Motor Trade

ing, they have found it at motor car races. It is true that every one, including the contest board and officials, have been fooled by the golden-tongued promoter.

Given a national circuit, with uniform enforcement of all rules; an assignment of dates arranged in proper sequence; certain conditions which all promoters must abide by; the introduction of the personal element into the sport; real value prizes; publication daily of the standing of the cars and drivers, and motor car racing in 2 years will take so firm a hold on the public as to rival the interest in baseball today.

Features May Be Introduced

Nothing here suggested is impossible of successful application and management. It may be that certain of them may not be deemed feasible at this time, and that other features, not treated of for lack of space, may be introduced, but for the protection of the sport and those who support it, whether he be maker, driver or spectator, let us have a truly national racing circuit, organized on broad lines and conducted by the contest board of the A. A. A. and the Manufacturers' Contest Association.

INDIANA AROUSED TO ROADS

Indianapolis, Ind., Jan. 9—There seems little doubt but that the Indiana legislature, which convened in biennial session last Thursday, will pass some good roads legislation. It is also expected that instead of merely paying a registration fee of $1, motorists in the future will have to pay the state an annual tax based on horsepower. In his message to the legislature, Governor Thomas R. Marshall had the following to say on the subject of good roads and a motor car tax:

"The highway laws of this state are wholly unsatisfactory. Their most serious weaknesses are found in the method of selecting supervisors and the permission to work out road tax. This permission enables corporations, by contract, to pay their road tax at about 50 cents on the dollar. To remedy this defect, all road tax should be paid in cash.

"Motor cars destroy public highways rapidly and a motor car tax should be exacted, the proceeds of which should be applied to the building and upkeep of highways. Reformation along this line should proceed slowly so that the people may become accustomed to a change in the methods of road work gradually instead of at once being compelled to transfer to the state the exclusive control of what has heretofore been believed to be a local function."

DETROIT, MICH., Jan. 9—Following New York's example, Detroit also will have two shows, and both will be on at the same time, January 16-21. The second show will be independent of the Detroit Automobile Dealers' Association exhibit in the Wayne gardens, and is a direct outgrowth of the space limitations of the Wayne gardens, the largest hall available for the purpose. The dealers and manufacturers who were unable to find accommodations here have banded together under the name of the United Automobile Dealers' and Manufacturers' Association and will hold an overflow show in the new main building of the Regal Motor Car Co., Piquette avenue and Beaubien street. One entire floor, comprising 60,000 square feet, has been placed at their disposal, so there will be ample room for all exhibitors. Admission will be free, but on invitation, and a motor bus service will convey visitors to and from the exhibit. No charge will be made for space. The list of cars to be shown is as follows:

Overland, Paige-Detroit, Carhartt, Ideal truck, White, Sibley, Woods electric, Black Crow, Peterson, Regal, Baker electric, Superior delivery trucks, Cole, Oakland, American Traveler, Cutting, Alpena, Imperial, Gramm truck. C. B. Fear is chairman of the show committee.

As to the main show, there is every indication that the predictions made for it several weeks ago will be more than fulfilled. The 29,000 square feet available originally has been stretched to 32,000 by the erection of temporary annexes and utilizing other space at first thought unavailable for exhibition purposes. When the doors are thrown open, January 16, the public will have an opportunity to inspect one of the most complete displays of motor cars ever seen in the United States.

Off for New York

The Wolverine special, chartered by the Wolverine Automobile Club, carried about 125 local tradesmen and their friends to the New York show last Wednesday. A large proportion of those who took the trip were members of the club. The train consisted of six regular coaches, two diners and one coach that had been reserved exclusively for the representatives of the Hudson Motor Car Co. The club pennant was much in evidence and every excursionist wore a badge bearing this inscription: "Membership 1,100 in 5 months; make it 2,500 by July. 'Boost.' I'm a Wolverine of Detroit, Mich."

Evidences of a revival are seen in the columns of the local dailies. The Brush Runabout Co. is advertising for experienced lathe hands, the Fisher Body Co. wants first-class millwrights and shaper men and the Packard Motor Car Co. can use five tool designers immediately. Several other concerns are advertising for foremen.

The Hale Motor and Machine Co., organized a year ago with a capital of $125,000, is moving into its new plant at 654-658 Franklin street. The company has a number of orders ahead for motors and transmission machinery. The company expects to have its plant in operation with a force of fifty men before February 1. S. E. Hale is president; Henry Walters vice-president, and Charles Ritter secretary and treasurer.

Following a friendly application by the Lewis Spring and Axle Co., of Jackson, Mich., for the Dominion Motors, Ltd., for the purpose of protecting the insurance, the latter concern has decided to go into voluntary liquidation. B. J. Fox, of the Fox Brothers Co., has been appointed liquidator. H. J. Leonard, of Detroit, will be inspector for the stockholders, and Attorney Culver will act in the same capacity for the creditors. Mr. Leonard explains that by taking this step the company wipes out $50,000 worth of watered stock that would have gone to the original promoters of the company. A reorganization of the company will be effected at once, as the Canadian field is considered a very promising one. The plant is located at Walkerville, just across the river from this city.

Howard Buys Barnes Stock

Frank Howard, who is connected with the Peninsular Savings Bank, of Detroit, purchased the stock, material and lease of the bankrupt Barnes Motor Car Co. for $10,025 at the sale conducted by the Security Trust Co., as trustee, last week. The assets include six finished cars. Mr. Howard will reorganize the company at once under another name and will begin manufacturing in the old plant on Howard street.

Estimated net earnings of the Chicago Pneumatic Tool Co., which operates large plants in Detroit and Cleveland and a motor truck plant in Franklin, Pa., were $700,000 for 1910. This is a return of about 11 per cent on the outstanding stock and is considered a remarkable showing. Its Detroit and Cleveland factories are working night and day and there has been no falling off in new orders. The truck factory is turning out about 100 cars per month.

The Warren Motor Car Co. has adopted an effective method of demonstrating the utility of its 1,000-pound delivery truck which recently made its appearance. Beginning today, one of the cars will be placed at the disposal of a different merchant each day for 30 days, with the understanding that he is to try it out on the toughest routes covered by his delivery wagons, free of cost. A record will be kept of all the stops.

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

STUDEBAKER-GARFORD TIMING

FRANKLIN, PA.—Editor Motor Age.—Will Motor age tell me how to time the valves in my Studebaker-Garford car? The Bosch magnetic plug system is fitted. The third cylinder seems to be late and I would like to know how to overcome it.—C. Hamhey.

It might have helped in diagnosing your case had you stated your reasons for believing the third cylinder of your motor to be late in firing. If you have arrived at the assumption because of a difference in the sound of the explosions of the different cylinders as indicated by the open petcock or the muffler, bear in mind that these indications are unreliable, because they are effected by an accumulation of carbon or dirt, in the case of the petcock; and when combustion is most complete in the cylinder and expansion most properly permitted therein, the noise of the escaping gas at the muffler is not so loud as a less powerful charge, whose expansion was delayed in the cylinder on account of poor compression, bad mixture, or late ignition. It is always well to have an extra plug in case of emergency, and when such a plug is on hand it is well to try it in the cylinder suspected of being tardy in its action. If it eliminates the trouble, one knows that the plug is out of order, and vice-versa. It is quite possible that your trouble is due to a leaky valve, and it would be advisable to test the compression by cranking the motor over slowly by hand. The Studebaker Automobile Co. issues an instruction book covering most of the ordinary troubles, and the care of the magnetic plugs is pretty thoroughly gone into in a pamphlet obtainable from any of the Bosch agencies.

WANTS MILITARY ROADS

Oklahoma City, Okla.—Editor Motor Age—Why should not our people demand of congress the immediate construction of three military roads across the Rocky mountains—one through western North Dakota, Montana, Idaho and Washington states; one on about a line with the Union Pacific railroad through the states of Wyoming, Utah, Nevada and California; and one through the states of New Mexico, Arizona and a part of California and Texas? The north road could be used for summer travel, the central road for spring and fall use, and the southern route for winter travel. These roads would be a great accommodation to the government, the farmer, rancher and motorist. They should bind the east and west together more than the railroads have. Should the government furnish the money to construct them, the money would not be lost, only put in circulation by giving labor to many a man, thus assisting him to support his family. The territory through which these roads would travel is made up of much untillable land, so it is almost a necessity that the government build the roads through it, as the states adjoining that are in the fertile lands could build state and county roads to connect with these mountain roads.—B. R. Harrington.

ADJUSTING A SCHEBLER

Meeker, Colo.—Editor Motor Age—Advise me how to adjust a model L. Schebler carbureter. I attached it to my two-cylinder 24-horsepower delivery car, and on a cool morning the gasoline would be sucked up into the intake pipe and drip down without being vaporized. I could start the engine by pouring gasoline through the spark plug holes, but it would soon stop and gasoline would be dripping from the carbureter. I tried all kinds of adjustments, but to no avail.—J. D. Moog.

Your trouble is by no means unusual, and it is most probably due more to the design and construction of the motor and to the involatility of the fuel you are using than to mal-adjustment of the carbureter. Since your motor is not provided with priming cups, you might use the combination priming cup and spark plugs known as All-in-One plugs, or plugs of the Breech-Block type. When a motor is cold, about a half teaspoonful of gasoline should be injected into each cylinder to start the motor, and after it has started it should not be throttled down, but should be allowed to run at a moderately high rate of speed for a few minutes, until it has warmed sufficiently to vaporize the fuel from the carbureter. If an attempt is made to throttle down a cold motor immediately after it is started, much of the fuel in the mixture produced by the carbureter never will reach the cylinders of the motor, because the air currents at low speed are not sufficiently strong to lift the spray up through the entire length of the inlet pipe. To adjust the model L carbureter, turn the slow speed adjusting knurl to the right until it stops, then open it about a turn and a half; open the throttle half way and start the engine. Close the throttle until the engine is running at the slowest desired number of revolutions, setting it with the slow speed adjusting screw. When this is determined, open the throttle until the little roller on the needle valve lever stands in the center of the first dial. By turning the cam-spring adjuster between 1 and 3, the adjustment for high speed or open throttle may be obtained. If the mixture appears too rich before making adjustment on the second dial, replace air valve spring with one of slightly less tension. It is advisable always to drain about a quarter teacupful of gasoline from the carbureter before starting on a cold morning, to eliminate any globules of water that might be present in the bottom of the float chamber.

CARBON DEPOSITS

Ligonier, Ind.—Editor Motor Age—Will Motor Age, through the Readers' Clearing House, answer the following questions:

1—Which will make the more carbon under the same conditions, gasoline or kerosene?

2—I have a model 10 Buick surrey, and the rear pair of cylinders flood with oil and drown the spark after being run 25 or 30 miles. How can this be remedied?

3—Will Motor Age kindly illustrate how the crankcase on the model 10 Buick is made, as I have not had it off?

4—Would it pay to patent an appliance to regulate the amount of oil to each cylinder of a model 10 Buick, or any other make using the same style of crankcase?—J. F. Fisel.

1—Kerosene will deposit the most carbon when a comparative test of kerosene and gasoline is made under the same conditions; but in a kerosene engine, so designed that complete combustion of the kerosene is as possible as that of gasoline is in a gasoline motor, the carbon deposit will not be any greater from the kerosene than from the gasoline.

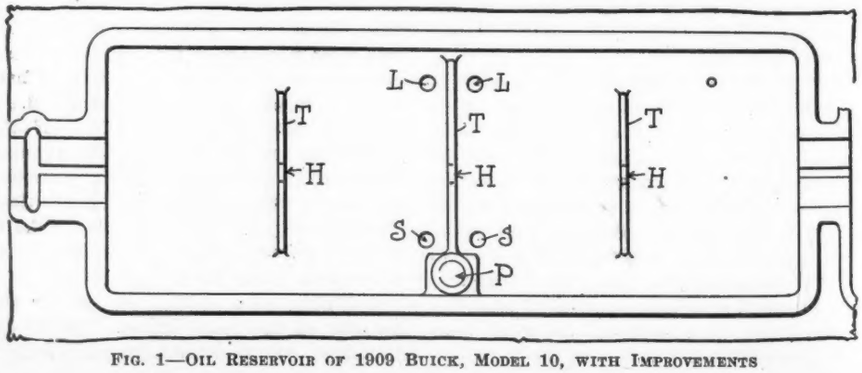


FIG. 1—OIL RESERVOIR OF 1909 BUICK, MODEL 10, WITH IMPROVEMENTS

Questions Asked and Answered

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

2 and 3—The construction of the lower portion of the 1909 Buick motor crankcase is shown in Fig. 1. It is subdivided as indicated, also horizontally, the upper division being divided into splash basins, into which the connecting rods dip, the lower division serving as a reservoir. In operation, the oil pump located at P draws the oil from the reservoir and forces it through an external lead to one end of the crankcase, just over or at the side of the camshaft. Entering the case at this point, it is intended that the oil will flow into one of the basins, and as the partitions T each has a hole H drilled through it near the center of the bottom, it is intended that a certain level will be maintained in each chamber alike. The center partition is the highest, and on either side of this partition on one side of the case there are two large holes L; these holes determine the level to be maintained in the splash basins, for when the oil reaches the lower edges of these holes it overflows into the reservoir below. Should one of the holes H become clogged up, it is obvious that there would be a shortage of oil in the basin farthest from the basin that receives the oil from the pump. It may be that this is the cause of your trouble. If the oil enters at the front end of the motor, perhaps at some time the hole in the middle partition became clogged and the supply in the basins under the rear cylinders was diminished to such an extent that the cylinders were scored and badly worn, so that now much of the oil works up past the pistons into the combustion chamber, with the results of which you complain. Then, again, it is possible that the oil enters your motor at the rear end of the case, or, if it enters at the front end and strikes the camshaft in such a manner that it runs along it back to the rear pair of cylinders, the rear cylinders may be getting too much oil and the front ones not enough. In some motors, which have suffered from an excessive oil-supply, a pair of holes S, similar to those at L but at the opposite side of the case, have been drilled, with favorable results. In the 1910 crankcase construction, which is shown in Fig. 2, no such trouble is experienced. A separate trough is provided for each connecting rod end to dip into, and each trough is fed by a separate lead, connected to the case at X. These leads are branches of a main lead or pipe extending alongside the outside of the case. The oil pump is located at O and the oil from the troughs overflows into the reservoir, in the lower portion of the case, through large slots G at the sides of the troughs. No trouble has as yet been reported with this crankcase construction.

4—All depends upon the degree of practicability of your idea and the strength of the patent.

FORD MAGNETO REPAIR

Glenburn, N. D.—Editor Motor Age—I have a Ford T which I am going to overhaul. It will miss on the magneto in certain places on the spark quadrant but will run all right on the dry cells. I have tested it with a new coil with no better results. The magnets were recharged late this fall, but gave no better service, and I am under the impression that one of the coils in the magneto has broken down. I thought of disconnecting each coil and testing it separately, but would like some light on the matter.—J. E. Thayer.

Since you are contemplating a thorough overhauling of your car Motor Age advises that you remove the entire motor and ignition devices from the chassis, have the outfit well crated, and ship it to the Ford Motor Co., Detroit, Mich., or its nearest branch that is properly equipped for repairs. A new Ford branch has been opened recently in Fargo, N. D. If shipped to the Ford company you can rest assured that the motor will be properly overhauled as both the facilities and workmen are of the best. No charge is made for the replacement of defective ignition devices and no one is better prepared to make these replacements than the factory. A charge will be made, of course, for the general overhauling, but the job will be better and less costly in the end, than if turned over to a repairman less familiar with Ford design and repair. If you send your motor to the factory, prepay the express or freight charges, and write a letter stating the nature of your troubles and the extent of the repairs desired. That is, you can request that merely the ignition system be overhauled; or that ignition, crankshaft and connecting-rod bearings be given attention; or, you can have the entire motor fixed up, which will include the taking up of all loose bearings, and the replacement of all worn or damaged parts that can not be adjusted, etc.

Should you deem yourself capable of making your own repairs, or if you have sufficient confidence in local talent, remove the magnets and the entire string of coils, send them to the factory prepaid, and a new set or the same set properly overhauled will be returned to you with no charges other than that of transportation. Trouble such as yours is sometimes due to a defective unit in the induction coil.

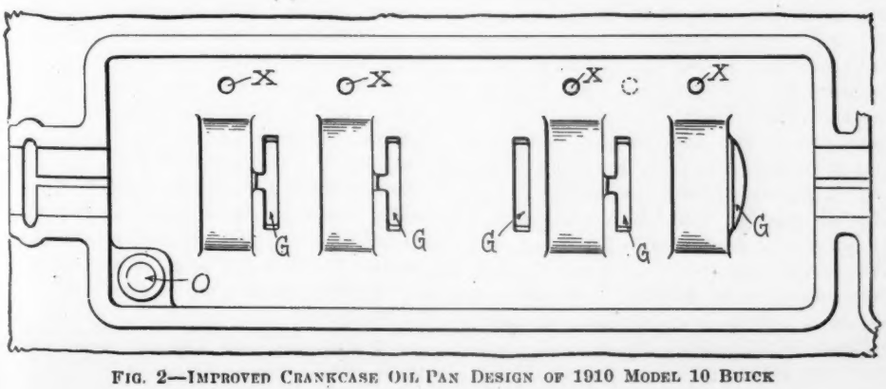


FIG. 2—IMPROVED CRANKCASE OIL PAN DESIGN OF 1910 MODEL 10 BUICK

FLANDERS 20 DETAILS

Biscay, Minn.—Editor Motor Age—Will Motor Age please answer through the Readers' Clearing House the following questions:

1—Can the levers on a Flanders 20 be changed to the center of the car, and how?

2—Can a Bosch magneto be installed on a Flanders 20 the same as used on the Hupmobile?

3—What changes will be made on the Flanders 20 for 1911?—Frank Kolar.

1—Motor Age has no record of any such change having been made on a Flanders 20, and to make such a change would be so costly as to be quite impracticable.

2—Yes. The larger Bosch representatives are equipped for this work; or if given the proper specifications will furnish the necessary fittings for the application of their apparatus to almost any type or make of car.

3—No announcements have been made as yet in regard to the changes to be made on the Flanders 20 for 1911.

KEROSENE FOR COOLING

Wyoming, Ill.—Editor Motor Age—I would like to ask through the Readers' Clearing House about the use of coal oil instead of water in the radiator of my E-M-F car. I have been using it a little lately and it seems to be all right, but I would like to hear from others as to whether it will cause any damage or not, and also get Motor Age's opinion. I have

been buying the cheapest grade of oil.—H. B. Brown.

The use of coal oil or kerosene as a cooling agent instead of water is extensively used in stationary engines that have no rubber hose connections. Kerosene is a good cooling agent and it does not freeze, but it does attack the rubber hose connections, causing the rubber to deteriorate, to become soft and doughy, and finally causing leaky connections. Hose connections are not very expensive, however, and, as kerosene is one of the cheapest anti-freezing liquids, it might pay to use it and renew the hose connections when they begin to leak from disintegration or decomposition of the rubber. Motor Age would be glad to hear from some of its readers on the use of kerosene as a cooling agent.

SETTING BOSCH MAGNETO

Jet, Okla.—Editor Motor Age—Please answer the following in the Readers' Clearing House:

1—Is the Auburn factory running now and about how many cars is it putting out daily?

2—Is the engine used in the Auburn 40 the same as the Rutenber motor?

3—Explain how to get a Bosch high-tension magneto so the spark comes at the right time.—W. H. M.

1—The Auburn output is 1200 cars per year. This is an average daily output of four cars.'

2—The Rutenber motor is used.

3—In Fig. 3 the rear end of a common type of Bosch magneto for a four-cylinder motor is shown with the covers of the distributer and breaker-box removed for inspection. Both covers were taken off by loosening the screw S, and turning the three-armed yoke, which holds the covers in place, about ½ inch in an anti-clockwise direction, so that it cleared the screws S, S1 and S2. It never should be necessary to loosen screws S1 and S2 to remove covers. The cover to the breaker-box B is secured by a blade contact spring, and can be removed readily, independently of the distributor cover, by drawing the blade about ⅛ inch away from the cover, then swinging it to one side. Both the distributer and the contact-breaker should be exposed when inspection of the magneto timing is desired. In checking the timing of this type of magneto, first have the motor turned over slowly in the direction in which it runs, and learn the direction of rotation of the revolving segment of the distributor. Let it be supposed that the distributer brush D has been found to turn in the direction of the hands of a clock. Next turn the engine over until No. 1 cylinder is on its firing center. Let it also be supposed, that on doing this, as the firing center of No. 1 cylinder is slowly approached the distributer brush and contact-breaker will be found in the positions shown in the illustration. At this point the spark-lever on the steering wheel

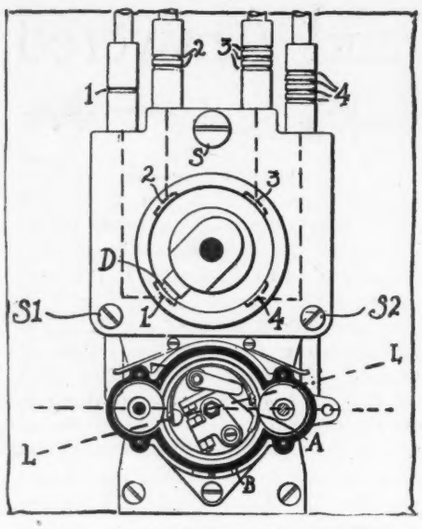


FIG. 3—BOSCH MAGNETO ADJUSTMENTS

should be fully retarded so that a straight line passing through the centers of the rollers will occupy the position indicated by the dotted line L. The motor then should be turned further until the piston passes the firing center and just starts to descend on the explosion stroke. If the timing is correct, then the contact arm A will be in contact with the roller, the platinum points will be wide apart, and the distributer brush D will still be in contact with the stationary segment 1. All that remains in checking up the timing is to see that the cables leading from the top of the magneto go to the right plugs. Assuming that the motor fires 1-3-4-2, cable 1 should go to cylinder No. 1, the front cylinder; cable 2 to cylinder No. 3, the third cylinder from the front; cable 3 to cylinder No. 4, the cylinder farthest from the front; and cable 4 to cylinder No. 2, the second cylinder from the front.

DISCUSSION OF WHEEL SIZES

Oklahoma City, Okla.—Editor Motor Age—I am a constant reader of Motor Age and have watched for some time for a discussion on the advantages and disadvantages of a 34-inch wheel and the 42-inch wheel. I have a car with small wheels and am considering buying one with at least 40-inch wheels.—H. A. Bump.

The steady growth in wheel sizes is a fair indication of the practicability of the use of the larger wheels on the motor car. The chief advantage of the larger wheel is its easier riding qualities, which are not only beneficial to the passengers but economical of the wear and tear on the mechanisms of the car, as well. The advantages of the small wheels over the larger ones are that they are more adaptable to high-speed work, or racing, because of their greater rigidity; a lower center of gravity is obtainable by their use, and there is, consequently, less liability of overturning when making turns at high speed; and quicker acceleration of speed, greater hill-climbing ability, and more power from the engine, is possible, due to the higher speed at which the engine can run. A wheel 34 inches in diameter, such is ordinarily used on touring cars, has a circumference of 8.89 feet and that of a wheel 42 inches in diameter a circumference of 11 feet, as compared with 7.86 feet of circumference on a wheel of 30 inches in diameter, and it is just here that the wear and tear of a small wheel comes in, whereas on the big wheel the ultimate saving is apparent. At a speed of 20 miles an hour a 30-inch wheel makes 219.4 revolutions a minute, a 34-inch wheel makes 194.4 revolutions per minute, while the large 42-inch wheel will make only 157.2 revolutions a minute. Carrying the comparison further, at the extreme limit of 60 miles an hour a 30-inch wheel makes 658 revolutions per minute, a 34-inch wheel 583 and the 42-inch wheel only 471 revolutions per minute. The saving on the wear of the tires and the moving mechanisms of the power and transmission systems, brought about by the use of the larger wheel is thus clearly shown. The nature of the service to which the car is to be put is, however, a factor worthy of careful consideration.

FIGURING COMPRESSIONS

Green Bay, Wis.—Editor Motor Age—I should like to ask a few questions in the Readers' Clearing House columns regarding gasoline motors as follows:

1—Is there any formula for determining the proper distance between a piston head and cylinder head for a given amount of compression, for instance, a 5½-inch bore and a 6-inch stroke. I wish 65 pounds compression with no valve pockets, on a two-cycle motor.

2—How many cubic inches in a cylinder 5½ by 6 inches, and what is the formula for figuring same?—D. Miller.

1—The height of the compression space should be 1.75 inches from the piston head, at the top of the stroke to the top of the combustion chamber. The calculation of compression is a simple mathematical calculation. Normal air has a pressure of 14.7 pounds per square inch. If you have a 1-cubic inch vessel filled with air it will be at 14.7 pounds' pressure. Should you put 2 cubic inches of air into the same vessel the pressure would be doubled or raised to 29.4 pounds per square inch. Put 3 cubic inches of air into this vessel and the pressure will be three times as great or 44.1 pounds. With 4 cubic inches the pressure becomes 58.8, and with 5 it is 73.5. The same applies to compression in a motor. A cylinder with 1-inch piston stroke and combustion chamber 1 inch high and of same diameter as the piston would have a cold compression of 29.4 pounds. Leaving the capacity of the combustion chamber the same and making the stroke 2 inches gives a compression of 44.1 pounds. A 3-inch stroke gives a compression of 58.8 pounds, and a 4-inch stroke 73.5 pounds.

2—A cylinder with 5½-inch bore and 6-inch stroke has a capacity of 142.55

cubic inches. This is obtained by first finding the area in square inches of the cylinder head and then multiplying by the stroke in inches. The rule to find the area of a circle which is the same as a cylinder head is $R^2 \times \pi$.

R = radius

$\pi = 3.146$

Then total capacity is

Capacity $= S \times R^2 \times \pi$

$= 6 \times 2\frac{3}{4} \times 2\frac{3}{4} \times 3.1416.$

WHEEL SIZES FOR RACING

McGregor, Tex.—Editor Motor Age—Kindly answer the following in the Readers' Clearing House columns:

1—Which is the more desirable for racing purposes, a 32 by 4 or a 36 by 4-inch wheel, and why?

2—Which of the two is the more desirable for fast road work over a hilly country?

3—I have a touring car which I wish to convert into a racer and would like to know if I can lower the steering wheel satisfactorily, and how?—W. T. Cavitt.

1—The 32 by 4 is the better for racing because the motor can accelerate quicker with the gear ratio, allowing of the car picking up faster. For track purposes the car is lower and the danger of upsetting is reduced. In racing the high speed of the motor is a potent factor and this is possible more with a 32 by 4 than with a 36 by 4.

2—For rough roads the 36 by 4 will ride the easier. The car will pull better on hills with 32 by 4-inch tires. The same is true regarding work in sand. With larger diameter wheels the gear ratio between the motor and rear axle should be altered.

3—It is impossible to tell you how to lower the steering column until the method of mounting the steering gear on the frame is known. Some steering gears are supported on rigid frame brackets, whereas others are on pivotal brackets, and so the slope of the steering column can be changed by lowering the supporting bushing in the floorboard.

WOULD IMPROVE OILING

Bradenville, Pa.—Editor Motor Age—There are so many queries and comments on the oiling system that one gets the impression that it is not altogether satisfactory. Oil once used in the cylinder gets a grainy substance in it and to use it over again and again it looks reasonable to think it would be objectionable. In the splash system one would think with a long-stroke motor, say 3-inch bore and 6-inch stroke on a slow speed about 100 revolutions per minute, that the piston would not get any oil at all, while running at a lively speed it would get more than necessary, while a high speed would scatter the oil, so it seems the piston would hardly get enough. I built a single-cylinder four-cycle experimental gasoline engine and the splash system was not suitable. I thought an engine ought to have some arrangement to oil according to piston speed, and herewith give a sketch of it. I bored a hole in the cylinder about half way of the suction stroke, put in a short piece of pipe, and on this a T; a short piece of pipe P was screwed up in the T with the end bored funnel-shape so a ball B would seat in it; a plug bolt O was screwed down from the top to keep the ball from too much play; two L's, two short pieces of pipe, and an ordinary glass-body oil cup C with needle valve V and lock nut N completed the outfit. The suction stroke draws the oil in, but the quantity can be nicely controlled by the set of the needle valve. The force of the explosion stroke is prevented from going back with the oil cup by the ball. It works first class in all speeds, and only uses the oil once. A glance at the oil cup shows what it is using. I have tried it at the beginning, middle and end of the suction stroke, and find it does not work well at the end of the stroke, there being either too little or too much oil. I should like to know if any one ever has tried it or if there is any objection to it?

There have been inquiries in Motor Age as to why a car skids, and the shortcoming of the differential has been shown up. I should like to ask why makers who use rear wheel brakes do not have their brake pedal divided into three parts? With a small shift of the foot to the left, the pedal would brake the left rear wheel, to the right it would brake the right rear wheel, and in the center it would brake both wheels. Suppose the left rear wheel drops into a sloppy mud hole, just buzzes around, and there you stay. Shift the foot slightly, brake that wheel and the other wheel has the push to get the car out. Say a right hand turn is to be made on a slippery road. The left rear wheel being the outside one it has to travel faster than the inner one. For the differential to make this farther travel it must have something to back or push against—just like a fellow pushing hard with his hands with something solid to put his feet against—so the inner wheels are what the differential has to back against. There is more power on the inner wheel than there is on the outer one and it keeps shoving the car straight ahead. The slipperiness of the road prevents the front wheels getting a grip to counteract the push of the right rear wheel, the result is a skid. With a divided brake pedal, slightly brake the right rear wheel and the frame of the car takes the place of the ground for the differential to back against. The left wheel would shove the front end of the car around to the right unhindered by the right. Which on the contrary would by braking, by dragging or holding back the right side of the car also greatly assist in the turning of the car and reduce the liability of the car to skid. Is there any reason why such an arrangement cannot be adopted?—J. Munden.

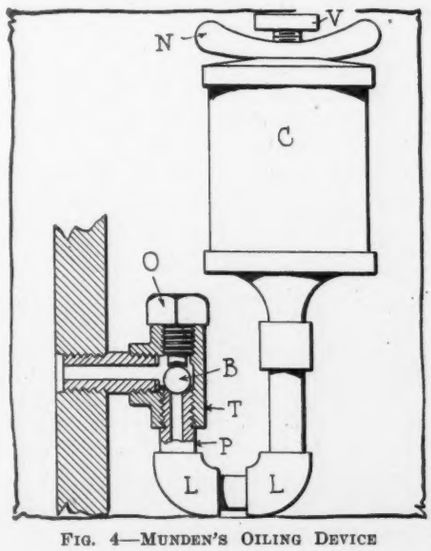


FIG. 4—MUNDEN'S OILING DEVICE

The suggestions seem very good and Motor Age invites criticism of them from qualified readers. However, oil in a properly designed and adjusted motor does not get too gritty from constant use until used too long. The reservoir of a circulating oiling system should be cleaned out thoroughly and a fresh supply of oil put in as soon as the oil begins to darken up, or after having been used a reasonable length of time. There is no reason why the braking arrangement cannot be adopted, but it might not be popular because of the greater difficulty in car operation and possible misuse of such facilities.

TAKING THE TEMPERATURE

New Haven, Conn.—Editor Motor Age—Now that we are at a period when it is necessary to use extreme care and caution to prevent the freezing of the water in a water-cooled motor car, it might be well to call attention to a very common and dangerous error. Nearly everyone, when trying to find the temperature of the water in the radiator, lays their hand on the upper part near the filling cap. This is a great error, and while this part of the radiator may be very hot, the bottom may be frozen. This state of affairs is due to the fact that the hot water being lighter than the cold, always will rise to the top. The moral is this,—if you wish to find out how cold the water is, feel the lower and not the upper part of the radiator.—C. Lansing.

ETHER FOR EASY STARTING

Newberry, S. C.—Editor Motor Age—I wish to state for the good of the order, that those using priming cups on their motors will find in starting in cold weather that instead of paying fancy prices for the higher grade gasoline, that by having a small bottle with a mixture of ether C. P. and ordinary gasoline in the proportions of about ½ ounce to 1 pint in the order named, and pour about a teaspoonful into each priming cup, they will only have to put the motor through one cycle before the motor will go. I have used a mixture of 3 ounces of ether to 5 gallons of gasoline with the most gratifying results.—Hummer.

From the Four Winds

NEW DRIVING MASK

Columbus Club Appointment—Dr. Walter E. M. Ranchous has been reëlected secretary of the Columbus Automobile Club, of Columbus, Ohio, by the newly elected board of governors. Frank P. McMakin was reappointed to the position of assistant secretary.

Meet at Los Angeles—A meet on the speedway at Los Angeles, Cal., on January 14-15 is announced. Among the entries already received are, de Palma in a Simplex; Wilcox, Merz and Herr, in Nationals; Fouch in a Staver-Chicago, Dearborn in a Fiat, Bert Dingley in a Pope-Hartford and several others.

Beach Meet at Jacksonville—The Jacksonville Motor Club, of Jacksonville, Fla., has scheduled a beach meet for March 27-30, which will be managed by E. A. Moross. An A. A. A. sanction has been granted, and a tempting lot of cash prizes is offered. Moross is in New York drumming up entries.

National Team Goes West—Howard Wilcox, Charles Merz and Don Herr have gone to Los Angeles, Cal., where they will pilot Nationals upon the mile board track motordrome, January 14 and 15. It is probable that, after the Los Angeles races, they will go to San Francisco and participate in the annual Portola road race next month.

Convention is Called—A good roads convention has been called to meet in Williamsburg, Va., January 24, at which time plans will be laid for bettering the road conditions in that section of Virgina. It is the hope of the people of Newport News, Williamsburg and the several towns along the James river, between Richmond and Newport News, to build a road connecting the two cities, which will make a direct route from Richmond to the coast, connecting with the proposed government military road between Yorktown and Jamestown.

New Driving Mark—An accompanying illustration shows a fur mask invented by Johnny Aitken, of the National racing team, and the idea has taken with every tester who drives in the zero weather of central Indiana. The mask covers the entire head, and has apertures for the eyes and mouth, while a celluloid piece covers the nose.

Aimed at Joy-Riders—The St. Louis Automobile Manufacturers' and Dealers' Association has caused its attorney to prepare a bill for introduction into the present Missouri legislature making it a felony for anyone to use a motor car without the consent of the owner. This is aimed to prevent joy riders from purloining cars left standing on the street, or employes from taking them from garages late at night. If the bill passes, it will mean a penitentiary sentence for violators.

Janesville Plans a Run—George S. Parker, president of the Parker Pen Co., of Janesville, Wis., has offered a $250 fountain pen, of gold, set with diamonds, as the trophy for a reliability tour open to all manufacturers in the United States. Mr. Parker's idea is to encourage midwinter motor runs. The start and finish would have to be at Janesville. Janesville motorists are planning to hold the run and are planning a route to include Chicago, Beloit, Madison, Milwaukee, finishing at Janesville. The trophy is a replica of the Parker pens made for the crown prince of Germany and for William Jennings Bryan. It is the idea of Janesville motorists to hold the run during February, probably at the time of the Chicago show.

What Delaware Wants—Several interesting bills are to be presented by the Delaware Automobile Association to the Delaware legislature. Among the number will be one exempting from taxation motor vehicles of city departments and fire companies; another requiring all vehicles to carry and use lights at night; another increasing the speed limit on rural roads from 20 to 24 miles an hour, which will conform to the Pennsylvania law. At present, it is a hardship for Pennsylvania motorists, when coming into Delaware, to have to reduce their speed 4 miles an hour. The association also will ask the legislature to authorize a bond issue for the improvement of the state road, which extends from the northern end of the state to the southern end. It is hoped to accomplish this and also to encourage road building by the three counties which comprise the state territory. It will be provided that the interest and principal of the bonds will be paid out of the revenue derived from motor car licenses.

Hotel Men Will Help—The Southern Hotel Men's Association, in session in Richmond, Va., put itself on record to forward the good roads movement. A committee was appointed which will hear all local complaints as to the conditions of roads and will make every effort to adjust the conditions. The Virginia section entered a protest against the toll system still in vogue on many roads, and bound itself to abolish as far as possible the system on such roads as use it in the state, and to prevent the establishment of any others.

Is Talk of Boston—There is much speculation going on in Boston regarding what the legislature will do relative to Governor Eugene N. Foss' declaration in his inaugural address that the present highway commission should be abolished and its work taken over by a public utilities board. The highway commission has done splendid work as far as constructing roads is concerned, but when the supervision of the telegraph and telephones was given to it the commission got in bad with the people by reason of its decision on telephones, and many criticisms were heard as a result.

Delaware Year Book Issued—The yearbook of the Delaware Automobile Association for the year 1911 has been issued and is being sent out by the secretary, Charles G. Guyer, of 826 Market street, Wilmington. The book contains a store of information of particular interest to all motorists living in the state or who tour Delaware. It states plainly the objects of the organization; the advantages derived from membership therein; enumerates the data in the hands of the secretary, with general, legal and road information from many states, maps, etc.

Tackles Second-Hand Problem—At a general meeting of the members of the Licensed Automobile Dealers of New York City, action was taken which will put the practice of trading in second-hand cars on a much more satisfactory basis, from the standpoint both of the dealer and of the public. The meeting was attended by a majority of those selling licensed cars in New York city, and there was no dissenting vote. Thus the new regulations will apply almost universally, as far as the business in licensed cars in New York city is concerned. The meeting voted to put into effect what is known as the Philadelphia plan of establishing a uni-

form basis for the trading in of second-hand cars. It was further voted by the meeting, that unlicensed cars would not be taken in exchange on any basis whatsoever.

Show Helps Road Project—An exhibit that attracted a great deal of popular interest at the recent Los Angeles show was the display of the Pacific Highway Association of photographs showing actual construction on this international road through the state of Washington and British Columbia. Many thousands of people, who had before only an indefinite idea of what the Pacific highway project meant, took with them literature that gave concise ideas of what the Pacific Highway Association was accomplishing and the progress that has already been made.

Going at It Right—Fred H. Caley, former registrar of motor cars in Ohio, who will take up his duties as general manager of the Cincinnati Automobile Club January 15, will be the leader in the fight before the Ohio general assembly to secure the passage of better road laws in the Buckeye state. One branch of the good roads fight to be taken up is opposition to the large appropriations for the maintenance of the canal system of the state. Motorists will try to show the legislature the inutility of spending money on the obsolete canal system, when it would be much more beneficial to the public at large used in building and maintaining highways.

New Club in Minneapolis—To promote the feeling of good will among dealers in Minneapolis, a club has been formed, which will be known as the Minneapolis Motor Club. The initial membership of sixty-three dealers already has grown to ninety-four. The officers of the club are: R. J. Randolph, president; A. E. Thompson and C. S. Marshall, vice-presidents; A. N. Smith, secretary, and T. E. Horton, treasurer. The directors are F. J. MacArthur, A. F. Chase and H. S. Haynes. The club headquarters will be at the Dyckman hotel. The club will hold contests, and for this purpose a committee was appointed, with Harold Vorce as chairman. H. E. Wilcox was appointed chairman of the technical committee.

Good Roads Memorial—The Waukesha, Wis., county board has adopted a memorial to the legislature opposing any of the following provisions in a good roads or highway improvement bill: Any law granting state aid; creating a state roads commission to supervise the construction of roads; embodying the initiative principle as tending to benefit the richer localities at the expense and exclusion of the poorer localities; making anything but the county the unit. The following provisions are favored: Requiring the county to levy an annual tax for highway work; that all roads be built according to standard and approved methods; making the county the absolute unit; that all roads be built under the supervision of a county roads commissioner, to be elected by the county board of supervisors. The county board will press its recommendations and dissensions before the legislature.

Board Track for Louisville—A 1-mile plank speedway will be built at Louisville, Ky., at a cost, including ground and construction work, of $250,000. Ray Harroun has been selected as advisory engineer during the construction. It is expected the track will be ready for service in May. The stretches will be flat, with high banked turns. The new speedway will be built on the property formerly occupied by the Douglass Park track, consisting of 80 acres.

Will Buy a Quarry—As part of the comprehensive good roads program started by the county and city of Milwaukee, Wis., a large stone quarry near Milwaukee will be purchased at once. It is expected to save $175,000 to $200,000 in crushed stone contracts each year. At present the stone costs $1.45 per yard, while the municipal quarry will be able to produce it for from $1 to $1.25 per yard. The quarry will be purchased by the city of Milwaukee, and the county will receive the benefit of municipal stone quarrying.

More Winton Prizes—The Winton company announces that the fourth annual test for Winton six chauffeurs, which begins April 1, will this year have a prize list of $3,500. In previous years the total awards were $2,500. These prizes will be awarded to those chauffeurs who make the best service records with Winton six cars, distance and repair expense to determine the winners. First prize will be $1,000, second $500, third $250, fourth $150, fifth to twentieth inclusive $100 each. Awards will be made by a committee of judges not connected with the Winton company. The 1911 prizes will make a total of $11,000 cash that the Winton company has distributed to chauffeurs. The 1910 contest had seventy-four competitors whose cars traveled more than 10,000 miles each. The total distance for these seventy-four cars was 801,231.7 miles, and the total repair expense, $1,089.16. This makes the average repair expense for all cars $1.36 per 1,000 miles.

Would Buy Toll Roads—The Kenton County Automobile Association which has been organized in Ohio, has adopted a resolution asking the fiscal court to acquire the toll roads of the county at a reasonable cost and thus do away with a motoring bugbear.

Women's Club in St. Louis—Plans for a woman's motor club, which is about to be launched in St. Louis, are expected to be completed before the opening of the St. Louis show in the Coliseum, February 13. The club will be divided into active and associate members. The associate members will be women who use cars merely as a means of transportation, and the active members will be more venturesome spirits, who guide cars on cross-country trips. Many socially prominent women are interested in the enterprise.

Helping Cause in Virginia—At a recent meeting of the Richmond Automobile Club, a new and lasting impulse was given to the good roads movement in that section of Virginia. Good roads was the slogan, and the motorists set about plans to accomplish the following ends: A direct and good road from Richmond to Washington; better roads to the North Carolina line, and the perfecting of a roadway to Gordonsville, Va. With the aid of the counties lying between Richmond and Fredericksburg, which seems virtually assured, the club aims to complete the Richmond-Washington road as far as Fredericksburg, after which they will appeal to the state legislature and the Virginia representatives in congress for aid. They are ready to get to work at once.

FLANDERS WHICH MADE NON-MOTOR STOP RECORD TO CALIFORNIA

Motor Hackney Cab Service in London Shows Great Growth

Interesting Figures Compiled Taking in Cost of Operation and Number of Vehicles in Use in Big City

ONE of the most interesting aspects of the motor age as regards the metropolis of London is exemplified in the benefits arising from the excellent vehicles which ply for hire in the form of hackney motor cabs. When one looks back at the state of affairs in regard to hackney vehicles which existed a few years ago, and compares them with the conditions of today, you cannot but applaud those who have been instrumental in effecting the improved state of affairs. The old hansom cab had existed quite long enough.

The attempt to supply London with hackney motor vehicles is of no new origin; as a matter of fact, immediately after passing the law permitting motor vehicles to run in Great Britain a company was formed to operate electric vehicles in London in the year 1896, and this company actually put upon the streets some fifty electric vehicles, and managed to eke out an existence for 2 or 3 years. Many remember the ceremony in August, 1897, when these electrical vehicles were put on the streets. Sir William Preece, the well-known electrical engineer, described the horse in the following manner: "The horse," he said, "is the most imperfect machine. Its principles are horrible to the engineer. It moves in unstable equilibrium. It is unmechanical in its movements, and very weak in the head, for if it got frightened or mentally disturbed, God alone only knows what it would do."

Early Days of Service

After the failure of these electric vehicles no further developments occurred until the year 1903, when one or two spasmodic attempts were made to run gasoline vehicles, and it was not until 1906 that any serious consideration was given to the requirements of London as regards the new form of traction. In that year a parliamentary select committee was appointed to go fully into the question of London's requirements. The evidence produced before this committee clearly showed that the multiplication during the previous 10 years of means of cheap, convenient transit had left the cab industry in a precarious condition, and that unless some radical change could be effected the outlook was a gloomy one for both master and men.

As a result of the deliberations of this committee an order was issued setting out the police requirements in regard to the standardization of a public service of motor vehicles, and it was further enacted that all such vehicles should be provided with taximeters, and the excellent arrangements which now prevail as regards the provision of motor cabs from the users' point of view, is due to the recommendations of this committee, with the assistance of the police officials. It may be said that the motor cabs of London today are an example to all other cities of the world, having regard to their general efficiency, cleanliness and suitability for the purpose to which they are put.

Facts and Figures

The following figures give the number of hackney carriages licensed from December 1, 1904 to August 31, 1910:

	Motor	Horse	Total
December 31, 1904.....	2	11,057	11,059
December 31, 1905.....	19	10,931	10,950
December 31, 1906.....	96	10,492	10,588
December 31, 1907.....	723	9,818	10,541
December 31, 1908.....	2,805	8,475	11,280
December 31, 1909.....	3,956	6,562	10,518
August 31, 1910.....	5,275	5,241	10,516

These figures will show the rapid growth of the motor vehicles.

It may be interesting to give a few statistics regarding the carrying capacity and earnings of these 5,000 odd cabs. Assuming that 4,000 only are available for public use throughout the year, and that each cab runs an average of 50 miles per day, the total miles run per annum will be 73,000,000. As a comparative figure the London county council tramways in the year 1909-1910 had a car mileage of only 43,160,186. The cost of London's cabs amounts to approximately $10,000,000, while another $2,500,000 must be added for cost of garage, equipment of repairing plants, etc.

The average receipts of the London motor cab amount to about $125 per day, and the average mileage from 50 to 52, so that the total earnings per annum will amount to about $9,075,000. Taking a few items of the expenses, $2,168,750 goes into the pockets of the drivers, whilst gasoline will account for $958,125, and renewal of tires $2,500,000 per year. The schedule of fares for these London cabs is fixed at 16 cents per mile, or if by time at $1 per hour.

Cost of Locomotion

A comparison of the cost of transit by various means may be of interest, taking time as representing money. The time element puts quite a different aspect on the cost of the various means of locomotion. Assume that the value of the time of an individual is based at $1.20 per hour, or 2 cents per minute, and then compare the cost under the following heads:

	Speed M. P. H.	Cost per mile Cents	Cost including time per mile Cents
Walking	3	..	40
Horse car	6	2	22
Horse bus	6	2	22
Motor bus	8	1½	16½
Electric car	10	1	13
Electric railway ..	24	1	6
Motor cab (1 passenger)	15	16	24
Motor cab (2 passengers, each) ..	15	16	16

From this table it will be seen that walking, which one would imagine to be the cheapest locomotion, is by far the most expensive. On account of the capability of the motor cab to pick up and carry passengers from door to door, it is in many instances on the money time basis the cheapest form of transit, and on that account must always be extensively in demand. Although the number of motor cabs in London is very large, it is estimated that by the year 1912 at least 7,000 in all will be licensed.

The total number of proprietors on November 26 last was 260, and the number of licensed drivers 5,800, which is certainly too few for the number of cabs which are licensed. It is calculated that the whole of the horse cab drivers who are competent to take charge of motor cabs have now been taught to drive and are duly licensed, and therefore the provision of new drivers is a very serious matter for the cab proprietors, as it is well known that a large number of cabs are being delivered to the larger companies.

The examination required by the police authorities before granting a license to a driver is very onerous, inasmuch as the candidate has not only to be competent in passing the driving test, but has also to bear an irreproachable character and to have a very complete knowledge of the geography of the city, and it is under this latter test that a great majority of the drivers fail to comply with the regulations.

Many Cabs In London

The General Motor Cab Co., which is the owner of some 2,500 cabs, and the first organization to seriously enter into the business, commenced operations with two-cylinder Renault vehicles. However, subsequent companies introduced four-cylinder cabs of from 15 to 20 horsepower, the motors being generally about 85 bore by 120 stroke, or 3.34 by 4.72 inches. There are many who say that these vehicles are too powerful, but nevertheless they are considerably more popular with the users, and are always taken in preference to the two-cylinder type. Where the two-cylinder type fails is in the long-distance runs, for which there is a great demand, and it is in connection with the long journeys that the motor cabs have proved to be most remunerative. It is generally concluded that eventually the two-cylinder cabs will be eliminated entirely. The maintenance cost between the two-cylinder and four-cylinder types is really quite immaterial, and although the gasoline consumption is somewhat higher, this is compensated for by the better class fares which are obtained.

The conditions of remuneration to the drivers are on the basis of 25 per cent of the takings shown by the taximeter, out of which the driver must pay for his own gasoline. As the drivers always prefer the four-cylinder vehicles, it is clearly evi-

Cost of Various Means of Locomotion Compiled in England

Statistics Demonstrate that Walking is the Most Expensive of Them all, Rating Being 40 Cents an Hour

dent that the four-cylinder car has the higher earning capacity.

Various estimates have been put forward from time to time regarding the expenses of running motor cabs, but allowing for reasonable depreciation the net cost amounts to $4 to $4.24 per day of 50 miles run, excluding, of course, gasoline, and on the assumption that the fleet of cabs is kept running up to a fixed percentage. Of the above cost about 50 per cent is represented by fixed charges, such as insurance, rent of taximeters, rates and rent, and the general supervision and staff charges. If, for example, 25 per cent of the total number of cabs are kept within the garage those fixed charges must be borne by the 75 per cent of cabs which are at work. It therefore follows that every cab kept within the garage is quite a serious loss to the owner. At least 48 cents per day per cab has to be added to cover expenses on this account.

Business Profitable One

Owing to a shortage of drivers many of the companies in London have been unable to use their cabs to the best advantage, but nevertheless the business has proved a profitable one, and the General Motor Cab Co. has, since its inception, paid regular dividends, in spite of the expenses and difficulties which are incidental to the institution of a new business.

The use of motor cabs is extending throughout the length and breadth of the land, and job masters are changing over to the new system as quickly as financial conditions will permit. From an educational point of view, the establishment of motor cabs in London has been of immense benefit to the whole of the motor industry, and has been the best possible proof of the utility and advantage of the new mode of locomotion.

TEST BILLED FOR PORTLAND

Merchants in Portland, Ore., as well as every merchant in the northwest are to be given an opportunity to observe the exact worth of the motor truck through a reliability run which will be held under the auspices of the Oregon Journal, Saturday, January 21. The Journal has put trucks to work in its own service and has found them highly satisfactory, and now wants to give some accurate demonstration of the value of these new merchandise distributors. In order to furnish an incentive for the dealers and to give standing to the contest, the Journal will give three cups to be competed for by the different types of trucks. The first for a truck of 2-ton capacity and over, the second for trucks carrying 2 tons or over, and the third for delivery wagons rated at 500, 100 and 1,500 pounds. Some of makes to compete and which are represented in Portland are the White, Frayer-Miller, Gabrowsky, Kisselkar, Knox, Packard, American and Mack.

OLD Dobbin again has been outclassed by a motor car in an economy test in Danville, Ill., corroborating the result of a similar test in Greater New York last October. The horse and the car were pitted against each other on a fair basis to determine their relative maintenance cost under actual conditions of service. The result of the test showed that the Maxwell incurred a passenger mile cost of 1.88 cent, while the cost of the horse and buggy was 2.4 cents per passenger mile. These figures do not vary from the New York figures more than one-tenth of a cent per passenger mile in either case. They showed that while the service was far different from that of the New York test, the Maxwell was consistent in its reliability as well as in its upkeep cost in both events.

RECENT TRUCK PERFORMANCES

A few days ago in Kansas City, in the presence of C. F. Rouze, branch manager of the Alden Sampson Mfg. Co. at that city, a Sampson 5-ton truck not only hauled a load of 17,214 pounds for the American Radiator Co., but carried this load for 7 miles in 55 minutes. The trip was started at Centropolis and part of the journey had to be made over hilly country. For this test, which was far-reaching and conclusive, there were 10,700 pounds of radiators on the truck, 6,000 on a dray that trailed, and the rest of the weight was furnished by four men on the truck and dray.

A 4-ton Sampson recently moved the furniture and belongings of a family in Ypsilanti, Mich., to Detroit, a distance of 32 miles, over sandy roads, in darkness, requiring 3 hours 5 minutes for the run. The costs were: Driver's salary, $2.75; helper's, $2; fuel, $1.15; allowing $1.50 as pro rata for depreciation, insurance and rent, the total would be $7.50. Freight would have been twice as much, and the horse cost three times as much. The furniture arrived quicker and in better condition, being handled only twice, railroad shipping would have meant six handlings and 6 days' time, while the horse method would take 2 days and the goods would be handled four times.

SOUTH STARTING SERVICE

Motor car service between New Orleans and Baton Rouge, La., is announced by the Yazoo and Mississippi Valley Railway, to begin this winter. This, it is said, is the first service of this kind in the south. It will handle passenger traffic only, leaving New Orleans at 6:50 a. m., and arriving at 9:40 a. m. The run is 85 miles, following the bends of the Mississippi river, and skirting some of the state's largest sugar plantations. Stops will be made at Laplace, Reserve, Garyville, Lutcher, Convent and Burnside, but if business justifies, all stops will be cut out, and the car will serve through traffic only. The inauguration of the novel service is well timed, as there is a special session of the legislature. Gasoline will be the motive power.

COMMERCIAL BREVITIES

The Electric Garage Co. of Omaha recently conducted a practical demonstration for one of the coal companies in Omaha, of the advantages of a motor truck over teams of horses. The Packard truck made three trips, carrying a total of 19,900 pounds for the three, or an average of 6,633 per trip. The actual running time for covering the 15 miles was 1 hour 20 minutes. Three gallons of gasoline and ½ pint of lubricating oil were consumed. On one trip, the truck was loaded with nearly 5 tons of coal, and easily run up the steepest hill in the city. The officers of the company estimated that, including depreciation, wear on tires, fuel and oil, pay for the driver, etc., the cost was but 12 cents per ton mile.

The first electric truck has made its appearance in Milwaukee, Wis. It is a Waverley and was purchased by the Weber Candy Co., wholesaler and retailer of confectionery. The truck has been operated every day since it was received, and is averaging 50 to 55 miles a day.

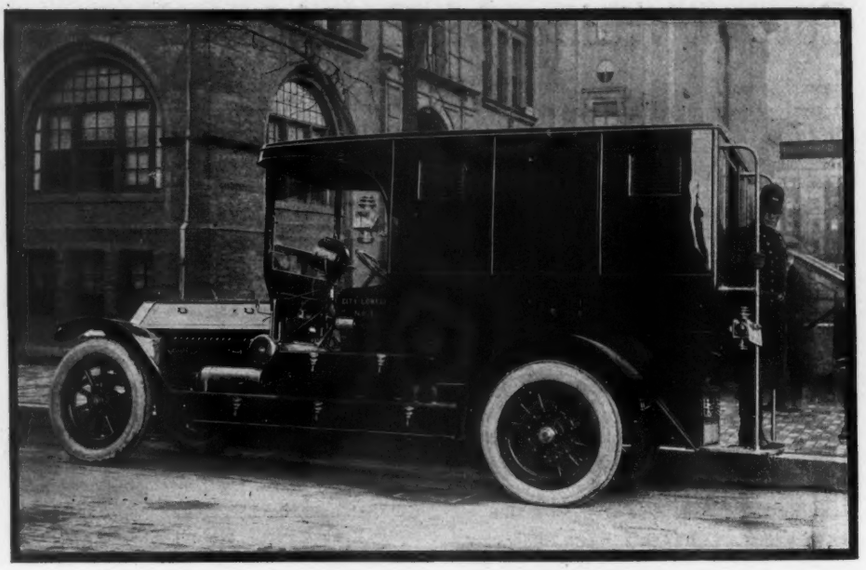
The city of Beloit, Wis., has placed an order with the American-LaFrance Fire Engine Co. of Elmira, N. Y., for a gasoline motor chemical and hose wagon for the Beloit fire department. The truck is propelled by a four-cylinder 70-horsepower motor, with chain drive. It will be equipped with one 22-foot slide extension ladder, one 12-foot ladder, a 40-gallon chemical tank, two 3-gallon pony Babcock fire extinguishers, four buckets, one acid receptacle and hose. The truck will be delivered in March, according to the order.

The Studebaker combination police patrol and ambulance purchased by the city of Racine, Wis., has been placed in service. To save tires, the car was shipped from Chicago to Racine by freight, in spite of the objections of some aldermen, who desired the trip to test the car. In the first test at Racine, the big truck skidded on the icy pavement and struck a telegraph pole, putting it out of commission for a half day, but it is running now.

The commercial electric seems to be gaining ground very rapidly in Chicago. The General Vehicle Co. recently made a contract with Marshall Field & Co. to supply them with six trucks of various sizes, and last week they contracted to furnish Rothschild & Co. a large number of delivery wagons, to be delivered later in the season.

UNCLE SAM'S LATEST IDEA

NOTICE of a novel proposition introduced in congress by Representative Hamill has been received at the Grand Rapids, Mich., postoffice. It provides for the experiment of a motor post coach mail service to be introduced on rural routes. It combines mail, express and passenger carrying. Particularly unique is the method of determining the cost of carriage of parcels. Merchandise or baggage contained in a box one-eighth the size of a standard suitcase, or 3 by 6 by 12 inches, will be carried for 1 cent within the route; parcels one-half the size of a suitcase, 5 cents; full size of suitcase, or of the capacity of the standard peach basket, 10 cents; bushel basket, 15 cents; half barrel, 20 cents; barrel, 25 cents. The carrier, however, need accept no parcel over 6 feet in length. Adult passengers will be carried for 10 cents a single trip, and school children for 5 cents. Only macadamized routes are to be selected. Two motor cars of carrying capacity of ten passengers and 1,500 pounds of freight are to be used on each route, one starting from each end at the same time twice a day. The cars must be able to make 100 miles a day. Sundays an extra service will be provided.



NEW THOMAS PATROL BUILT FOR CITY OF LOWELL, MASS.

The Realm of the

MEXICO TAKES TO THE MOTOR

The feasibility of establishing motor car lines between Temosachic, Mexico, and other railroad points in the state of Chihuahua and several of the more remote mining towns and districts is being investigated by R. F. Miller, of Searchlight, Nev. Some good roads have been recently constructed through the mountains, notably the one recently finished between Temosachic and Ocampo, and it is stated that they are capable of accommodating motor cars. It is the purpose of Mr. Miller to operate these lines for the benefit of the passenger travel, as there always is more or less going back and forth between the different mining towns by mine owners, machinery salesmen and others. There are many parts of Mexico which offer inviting fields for the establishment of motor service, and enterprising Americans are preparing to take advantage of these opportunities that are offered them.

The introduction of motor cars into the rural districts of Mexico is going on rapidly. The machines already are in use upon many of the larger ranches, and not a few of the mining concerns have recently adopted this modern method of transportation. Places that were formerly 3 or 4 days' travel from the nearest railroad point are now placed within a few hours' touch of the outside world by the use of motor cars.

The people of the City of Mexico have set the pace for the remainder of the republic in the use of motor cars as well as in many other things. It is stated by the representatives of motor car manufacturers that the demand for these machines in the capital of the country has increased wonderfully during the last few years, and that the effect of this condition is beneficially felt all through Mexico. Many sales are being made in all the larger towns, such as Guadalajara, Monterey, Chihuahua, San Luis Potosi and other places.

SERVICE IN BALTIMORE

A White delivery truck of 1½ to 2 tons is doing excellent work in department store suburban delivery service outside of Baltimore. This truck is owned by the large department store of Stewart & Co., and has

FIVE-TON SAMPSON FREIGHT MOTOR CARRYING LOAD OF COAL FOR KANSAS CITY CONCERN

WHITE CAR USED BY STEWART & CO., OF BALTIMORE

Commercial Car

been in service since last July. The best idea of just what the truck has acomplished since being in operation can be had by quoting J. L. Cassard, superintendent of delivery of Stewart & Co.

"Since the middle of July," said Mr. Cassard, "our White gasoline truck has replaced three two-horse suburban wagons. The truck averages from 60 to 75 miles a day and for 6 months ending December 1, the total mileage would average something like from 13,000 to 14,050 miles. The car is in service every day except Sundays and holidays from 10 o'clock in the morning until 6 and 7 o'clock in the evening. During the course of a day the truck makes from 260 to 320 stops. The main operating cost is due to the tires—this cost reaching about $50 a month at the present price of tires. This appears rather heavy, but it is due chiefly to the fact that in many cases the truck has to take in rough and rocky thoroughfares, as well as the smooth highways, for deliveries are often made in the rear of residences off from the main roads. The truck averages about a quart of lubricating oil a day."

DEMONSTRATION IN KANSAS CITY

That the commercial vehicle can accomplish more work in less time than a four-horse-drawn vehicle was forcibly demonstrated in Kansas City recently. A horse-drawn vehicle carrying a heavy load of alfalfa and a 5-ton Sampson truck carrying 5,820 pounds left the Kansas City railroad station simultaneously, each bound in opposite directions. The Sampson driver delivered his load 11 miles distant and returned in 3 hours. The motor truck again was loaded with 5,420 pounds of alfalfa for the farmer for whom the horse-drawn vehicle had started on its first trip. As the Sampson reached its destination 10 miles from Kansas City the driver of the four-horse team had just started to unload. While the horse vehicle was delivering 7,700 pounds a distance of 10 miles the Sampson truck carried two loads aggregating 11,240 pounds for 21 miles.

The driver of the Sampson truck jokingly suggested that he might cart the horses and wagon back to Kansas City in his truck. The offer was unexpectedly accepted and the four horses were loaded into the motor truck while the wagon was hitched behind. Crowds of Kansas City people cheered the Sampson as the horses were driven into the city on their first joy ride.

HUB INSPECTS PATROL

Manager C. S. Henshaw, of the Boston Thomas branch, gave the police officials of the Hub a good look at a modern police patrol wagon a few days ago, when he had the machine that was built for Lowell, Mass., driven up to police headquarters for inspection. Police Commissioner O'Meara took a look at it and then delegated Superintendent Pierce and Deputy Superintendents Warren and Watts to get the details relative to it. All the inspectors at headquarters were also given a look at it. The police officials thought it was a fine wagon and that a few of them located in central sections of the city would prove fine for first aid, ambulance, patrol and other useful purposes.

PEACE AT BOSTON

The olive branch has been passed in Boston and the clouded atmosphere that hovered over the commercial field has given away to sunshine. Now instead of there being a couple of associations seeking all the laurels in the truck field, there is but one, and it is bound to be a prominent factor in everything pertaining to motoring. The conference committees representing the Boston Motor Truck Association and the Commercial Motor Vehicle Association having full power, decided to form one large organization embracing both, and so the Boston Commercial Motor Vehicle Association was formed. The officers elected represent men from both the other organizations, and they are as follows: C. F. Whitney, of the Alco, president; L. B. Butler, of the Rapid, vice-president; Day Baker, General Vehicle Co., treasurer; Chester I. Campbell, secretary. The first three also are directors with the following: J. H. MacAlman, Stearns and Columbia; A. B. Henley, Frayer-Miller.

SAMPSON TRUCK CARRIES 5,950 POUNDS OF MILK IN LOS ANGELES

Among the Makers and Dealers

PREST-O-LITE REPRESENTATIVES IN ANNUAL MEETING

1—Copeland, general auditor; 2—Langston, auditing department; 3—Agnew, traffic department; 4—Coffield, auditor; 5—Blossom, auditing department; 6—Paxton, Cleveland; 7—Winters, counsel; 8—Strack, Milwaukee; 9—Combs, St. Louis; 10—Sweet, vice-president; 11—C. Allison, Boston; 12—Moskowitz, engineer; 13—Menten, Philadelphia; 14—Pettit, New York; 15—Stevenson, Dallas; 16—Shaffer, Omaha; 17—Noble, traffic manager; 18—Newkirk, Kansas City; 19—Elliott, Providence; 20—Morgan, Detroit; 21—Cooley, home office manager; 22—Heeth, Minneapolis; 23—Snyder, auditing department; 24—Hanna, Boston; 25—Skinner, superintendent; 26—Allison, secretary and treasurer; 27—Hicks, purchasing agent; 28—Armstrong, sales manager; 29—Coughlin, Cincinnati; 30—Adkinson, Chicago; 31—Rork, assistant superintendent.

MITCHELL Production—The Mitchell-Lewis Motor Co., of Racine, Wis., is now shipping from twenty-five to thirty cars daily by lake and rail lines.

Making Trucks in Pittsburg—The Pennsylvania Motor Car Co., of Pittsburg, which was recently formed with a capital of $500,000, has selected a north side site of 20,000 square feet and will manufacture one truck a day. This output will later be increased to three trucks a day. The stock is being sold by John T. Walsh, Peoples' Bank building.

Hutchinson Makes a Change—Oliver C. Hutchinson, for 5 years with the Thomas B. Jeffery Co., at Kenosha, Wis., has resigned to become general manager of the Welch-Detroit factory of the General Motors Co., at Detroit. The Welch company will exploit its car much more extensively than in the past and Mr. Hutchinson will be in charge of the entire plant, including production and distribution.

Crow Company's Plans—The Crow Motor Co., of Elkhart, Ind., has purchased of H. E. Bucklen the factory building now occupied by it, at the corner of Main and Simonton streets, and arranged for a number of extensive improvements. Heretofore the Elkhart concern has disposed of all its product to the Black Mfg. Co., of Chicago, but in the future the Elkhart company will itself direct the sales of its machines. Though it will maintain a general sales office in rooms 1311-12 of the Rector building, Chicago, in charge of C. C. Darnall, formerly with the Black Mfg. Co., and preserve that sales organization, advertising will be directed from the Elkhart office. The car's name will continue the Black Crow. The company has already booked orders for over 400 cars for 1911 delivery.

Gordon Selden Treasurer—Announcement is made that George C. Gordon has been appointed treasurer of the Selden Motor Vehicle Co., of Rochester, N. Y.

Will Make Carbureters—Beloit, Wis., which gained prominence in the motor world through the activities of the Warner Instrument Co., is preparing to receive a new industry, a carbureter factory. William Fulton, inventor of the new device, and Dr. C. E. Smith are to build a factory, including a brass foundry, in the spring. Mr. Fulton has been employed for many years by the Thompson Mfg. Co. at Beloit. His carbureter is adaptable to any type of internal combustion engine and it is valveless.

Caring for the Workmen—A number of innovations tending toward the comfort and welfare of employes have been introduced at the plant of the Seager engine works at Lansing, Mich. A restaurant and lunch counter have been put in. A mutual aid association also has been organized. The employes conduct the association themselves. Dues of 30 cents a month are deducted from the pay of each member by his consent and are turned over to the secretary of the association. Members receive $7 per week in case of accident or illness. If death results a benefit of $100 is paid. Should the wife of a member die he receives $50 and should his child die the benefit amounts to $25. The company maintains an emergency hospital in connection with the plant and the equipment, in charge of a competent man, compares favorably with that of any such hospital in the state.

Beats a Gasoline Bill—Because of the opposition of the motor car agents and garage owners in Columbus, Ohio, an ordinance pending in the city council placing drastic restrictions about the storage of gasoline was defeated. The ordinance had been before council for a year and was fought vigorously by motorists generally.

Increases Stock—At a meeting of the stockholders of the Hagstrom Brothers Mfg. Co., at Lindsborg, Kansas, held recently, the capitalization of the company was raised from $150,000 to $300,000. The enlargement was found necessary on account of the fact that the present factory is inadequate to produce the Hagstrom blowout patches and soot proof spark plugs already sold for 1911 delivery. Phil E. Zimmerman has been advanced from general salesman to advertising manager of the company.

New Kinsey Plant Opened—What is declared to be the strongest factory structure in the state of Ohio, was thrown open to public inspection this week by the Kinsey Mfg. Co., of Toledo. About 500 manufacturers, city officials and business men attended the reception. The building is especially constructed for the handling of parts turned out by the company, and some sections of the building where metal stocks are kept are capable of sustaining a weight of 1,400 pounds to the square foot. It is constructed of reinforced concrete. The reception was both enjoyable and educa-

tional. A luncheon was served in the building and music was supplied by the Willys-Overland band of thirty-six pieces. The new building comprises about 115,000 square feet of floor space and furnishes employment to about 700 skilled employes.

Tire Prices Again Reduced—All of the Akron tire companies reduced the price on tires beginning with the first of the year, although they did not go into effect on the same day. The reduction was 10 per cent on casings and 15 per cent on tubes. This reduction was in addition to an average reduction of 17½ per cent made by most of the companies a month before. The reduction is due to the lower price of crude rubber.

Will Furnish Teachers—Milwaukee motor truck builders will furnish teachers for a school of instruction to be held in connection with the commercial car exhibit at the third annual Milwaukee show, January 14 to 20 inclusive. Fourteen factories and dealers will have exhibits, occupying the entire basement under the arena of the Auditorium. The school of instruction is meant for business men and manufacturers, to show them how they can replace their present horse equipment with motor power at less maintenance cost and extending their activities beyond the present horse-bound territory.

Completing Motor Plant—The Wisconsin Motor Mfg. Co., of Milwaukee, Wis., expects to be able to take occupancy of its new plant in the new southwest Milwaukee manufacturing district on January 1. The plant at North Milwaukee is operating at full capacity and may not be abandoned at once after the new shops are completed. The main building of the new plant, located at Forty-fourth avenue and Burnham street, is 288 by 112 feet in dimensions, with an administration building 40 by 50 feet, two stories high, and a power plant 50 by 50 feet. The company builds a line of motors in four types.

Prest-O-Lite Convention—Salesman and branch managers of the Prest-O-Lite Co. recently attended the annual meeting in Indianapolis. All branches were represented with the exception of Baltimore, Los Angeles, San Francisco, and Seattle. The only charging plants not represented were those on the Pacific coast. Among the interesting talks given were those by Mr. Allison, the secretary and treasurer of the company; Keyes Winters, counsel; Mr. Cooley, home office manager; Mr. Moskowitz, engineer; and Mr. Armstrong, sales manager. Mr. Winters went very thoroughly into the legal aspect of the firm's business, citing the large number of cases decided in its favor, and giving a list of suits pending and suits in process of preparation. A thorough discussion was had as to the patent rights of the Prest-O-Lite Co., and the policy of maintaining these rights as held by the company. Interesting experiments and tests were made by Skinner, Moskowitz, Hess and Combs. Combs gave demonstrations and talks on Prest-O-Carbon remover, and the value of pipe-line testing was gone into very thoroughly by all branch managers. The men were entertained at dinner at the Columbia Club by Mr. Allison.

Bradley Makes a Change—L. M. Bradley has retired from the publicity department of the United States Motor Co. to become identified in a similar capacity with the E-M-F. Mr. Bradley's place on the United States Motor Co.'s staff has been taken by M. H. Newton, formerly a New York newspaper man.

Remodeling Case Plant—The motor car plant of the J. I. Case Threshing Machine Co. at Racine, Wis., formerly the Pierce Motor Co., is being remodeled and additions to greatly increase the capacity are now considered. Additional machinery has been installed, but the production of Case cars is still too small to care for the increased demand resulting from the consolidation of the Pierce company with the Case interests.

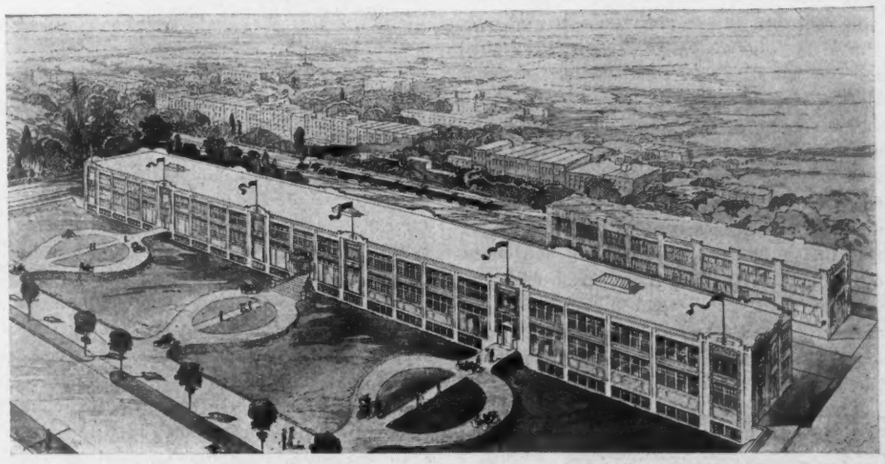
Runs a Night School—The Chicago Brass Co., of Kenosha, Wis., has introduced an innovation in factory practice that is attracting unusual attention. With a view to obtaining more efficient work from its employes, the company has at its own expense opened a free night school in the plant, 150 employes enrolling on the first evening. The school is under the direction of the Kenosha Y. M. C. A., although the company is in full charge and directs the policy. Other Kenosha shops are studying the idea.

New Stores in Boston—Work will be commenced in a few days on the new home for the Locomobile, Winton and Stoddard-Dayton companies in Boston, the final papers having been passed whereby forty-seven lots of land valued at $178,000 in the back bay were turned over to a real estate operator for improvement. Plans have now been drawn by prominent architects and when the building is finished it will be one of the finest in the country. It will have a frontage of 550 feet and give a total floor space of about 100,000 square feet. When it is finished it will represent an investment of $200,000 above the land or a total of about $400,000. The three companies have secured 10-year leases and they expect to be in the places in the fall. The Winton will have the center and the Locomobile and Stoddard-Dayton the two ends.

Big Truck Wheels—An unusual shipment was made last week from a manufacturing concern at St. Marys, Ohio. It consisted of several sets of gigantic motor truck wheels for parts of 95 horsepower vehicles for use in the desert service. These vehicles will replace the mule teams engaged in hauling borax through Death Valley, Cal. The wheels are ball bearing and fitted with steel tires 1 inch thick and 1 foot wide. The unusual width is to prevent miring in the sand. The wheels are 4 feet high and weigh slightly more than 1 ton per set.

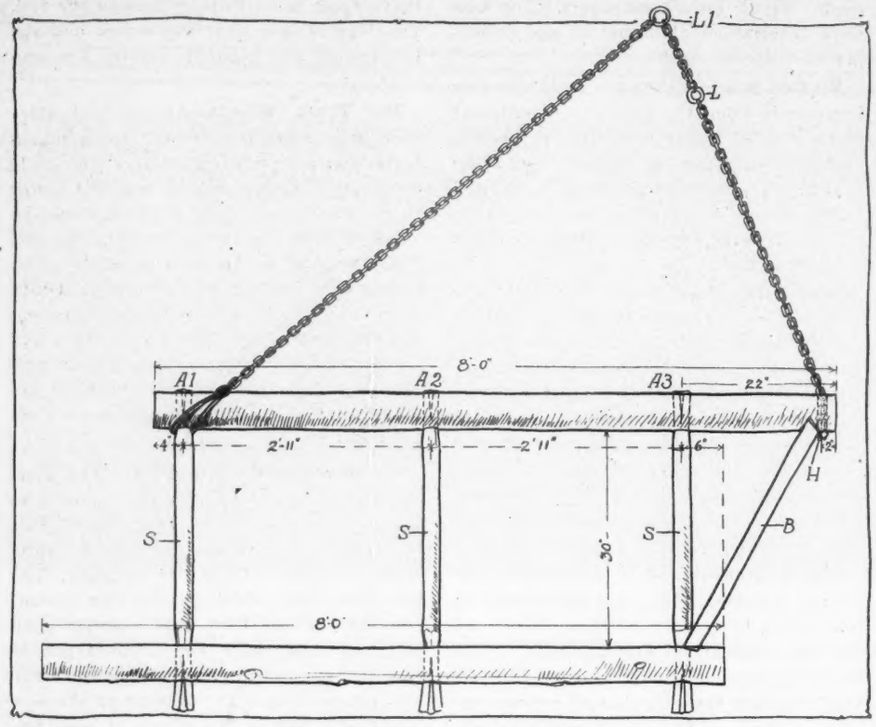
Firestone Erects Rim Plant—The Firestone Tire and Rubber Co. has gone into rim manufacture on a large scale. This announcement was made by H. S. Firestone, president of the tire company. The new rim plant which adjoins the present tire factory, has been kept a secret until fully equipped with the latest types of machines for rolling, shaping, electric welding, galvanizing, etc. As soon as the new tire plant, now in the course of construction, is completed, most of the tire manufacturing will be moved thither, leaving the present factory for additional rim machinery.

Lozier Promotions—With the completion of the new works of the Lozier Motor Co. at Detroit, next spring, John G. Perrin, superintendent of the present works at Plattsburgh, N. Y., will take charge of the combined works of the Lozier Motor Co. at Detroit and Plattsburgh, with the title of chief engineer and factory manager. Manager Perrin's headquarters will be at Detroit after February 1, although he will still continue to exercise general supervision over the plant at Plattsburgh. E. O. Pollard will remain at Plattsburgh as factory superintendent, while T. C. Collins will act in the same capacity at the Detroit works.



PROPOSED LOCOMOBILE, WINTON AND STODDARD STORES IN BOSTON

Construction of the Split-Log Drag for Highway Scraping



How to Build a Split-Log Drag

By F. V. Crandall

THE secret of a good road consists in keeping an even surface on which the water cannot stand and soak in, and so damage both the road surfaces and the ditches. This can be done with the split drag. To maintain a good road frequent use of the drag is necessary. Use it after every rain and drag the road in both directions; this will prevent ruts and mud holes.

Farmer Realizes It

The farmer who manufactures a split-drag according to the directions given later on in this article and who works ½ mile of road opposite his farm with this drag will soon demonstrate to his own satisfaction the real value of good roads over which heavy loads can be drawn. Your road to town is no better than the worst mud hole in it, because the largest load you can haul is the one you can pull over the worst places. A road is only as good as its worst spot; this is but another adaptation of the old proverb, "a chain is as strong as its weakest link." You cannot get away from the fact that dirt and water mixed together make mud, and that the depth of the mud depends on the amount of water mixed in it. Get rid of the water by going over the road after every rain with your split drag and you will have a good road. Water is the enemy of good roads and you have to fight it; if you leave it, it makes trouble in the way of mud holes and washouts. Get the water into the ditches. Get the water off the road; get it into the ditches; and the drag is the best solution of both.

If the road bed is a fine-grained clay, try mixing in a few loads of sand and gravel where it remains softest the longest after a rain. If you cannot get sand there may be a coarse soil on your farm which will answer the purpose. In filling in the road, do not get the middle or crown too high, otherwise traffic will use the middle entirely and ruts will so develop. Build the road as wide as you can. A narrow road is a hard road to maintain, on account of the teams tracking with their heavy loads. Do not plow a road when you can avoid it and do not fill holes with brush or sod; they will soon crush in and the hole will remain. Have the ditch on either side wide and shallow. Have plenty of fall to carry the water off, because the sooner it is away from the road, the better.

Simple Thing to Build

A split drag is a simple thing to build, and because of its simplicity some people have no faith in it. With a drag properly built you will soon learn to use it so as to get the best results. Don't make your drag too heavy, for it is a one-man machine and you will have to lift it once in a while. A light drag will respond quicker to the shifting positions of the operator. Elm, box elder or soft maple make the best. The log should be 8 feet long and 8 to 10 inches in diameter, split as near the center as possible and use the heaviest and best slab in front. Four inches from the end that is to travel in the middle of the road bore a 2-inch auger hole A-1; in middle of face of the slab 22 inches from the ditch end bore another 2-inch hole A-3; half way between these two holes bore one more A2. Be sure they are all in line and in the middle of the slab. Now bring up your rear slab and let the ditch end overlap the hole A3 in the front slab about 6 inches; this will leave the ditch end of front slab about 16 inches nearer the ditch than the rear slab when joined together. Mark and bore three holes in the rear slab and you are ready for the stakes. Use stakes 2½ inches in diameter. Shave the ends of them down to fit the holes in the slab. Have the slabs 30 inches apart and wedge your stakes. Saw the stakes off flush with face of the front slab and let them project about 4 inches back of the rear one. These will be handy in handling the drag. Before you drive on the rear slab arrange a brace B. This should be fitted in a notch cut in the ditch end of the front slab about 3 inches from the end and bracketed against the stake where it goes into the rear slab. Fit the brace, drive on the rear slab and you have got it. Next bore a 1½-inch hole H 2 inches from ditch end of the front slab and in the center. Secure a trace chain of regulation length and 10 feet of No. 9 wire. Pass the wire around the stake A, pass the wire around the stake twice and twice through the ring on end of trace chain; then tie. Pass the fore end of the chain through the hole H and drop an old bolt in the link. Now take hold of the chain and pull your drag in shape so that the front and rear slabs track. Cut a link in the chain and put in a split link L about 12 inches towards ditch end. Put in another split link L1. These links should be large enough to work your doubletree clevis in.

King's Way of Doing It

D. Ward King, the father of the split-log drag, says to make a platform to stand on of inch boards to drop between the slabs. He advises using three boards and spacing them 1 inch apart, so the dust that comes over the front slab will sift through. This is all right for dry dirt, but how about stiff mud? I find it best to leave out the middle board and have the left-hand board so it can be shifted to the right side of the right-hand board. This gives the driver a chance to stand nearer the ditch end of the drag in working out ditches. A slight change in lengthening or shortening chain will make the drag cut deep or shallow. You can soon learn to gauge this for yourself.